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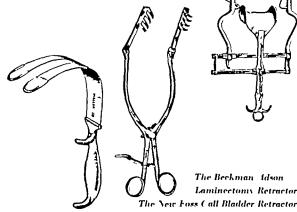
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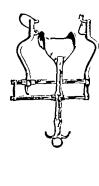
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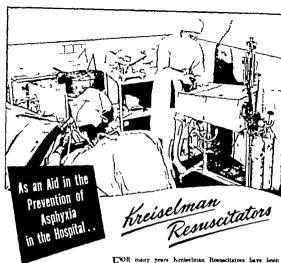
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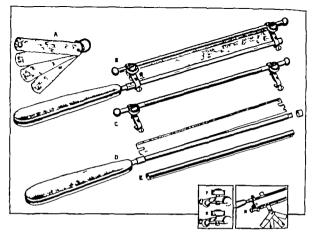
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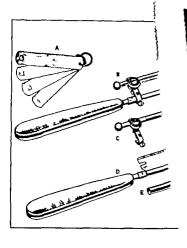
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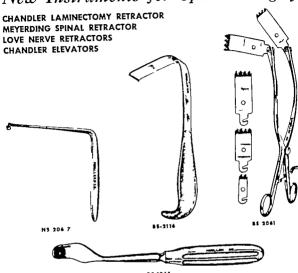


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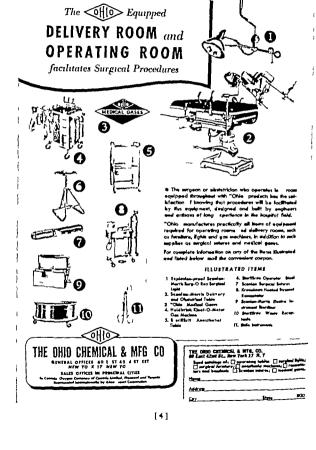
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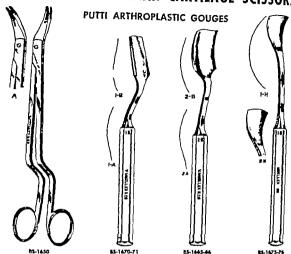
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name Ohio on a cyli der of cyclopropone is doubly significant. "Ohio" not only represents highest purity quality and uniformity but is also a reminder that cyclopropane has gained favorable recognition as a dependable anesthetic through the pioneering and axistance supplied by "Ohio laboratories and "Ohio technicians in the development of cyclopropase

One of the world's leading montfacturers of medical gases and administ ring equipment "Ohio

always ready to ploneer and to assist in new de elapments which will provide the medical profession with safe, dependable on-





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# **SURGERY**

## GYNECOLOGY AND OBSTETRICS

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#### TRAUMATIC ANEURYSM

The Matas Operation-Fifty-Seven Years After

DANIEL C. ELKIN M.D., F.A.C.S. Colonel M.C. A.U.S. White Sulphur Springs, West Virginia

HE report of the first patient treated by endoaneurysmorrhaphy was made by Dr Rudolph Matas in the Philaddelpha Medical News October 27 1888 In the 57 years which have intervneed since that memorable publication no alterations in the technique of the procedure other than minor niceties have been made Few operations have stood this test of time and none has had a more profound effect upon the surgery of blood vessels

Dr Matas has recorded the story of his first operation as follows

On April 6 1888 I operated upon a young male Negro for a very large traumatic (multiple gunshot) aneurysm of the brachiel artery extending from the armpit to the elbow which opened my eyes to the possibilities of an entirely new method of con servative treatment which was to revolutionize my previous notions of aneurysmal surgery case, the successive ligation of the main artery on the proximal and distal poles of the aneurysm had been followed by relapse and it seemed to me, then that I had no other alternative but to extirpate the sac. When I exposed the sac and emptied its contents the failure of the ligations to control the circulation was easily explained by the appearance in the bot tom of the sac of three large orifices corresponding to the collateral branches which opened into the sac in the segment of the artery included between the ligatures (Fig 1) It was evident that it was these collateral orifices that fed the sac despite the liga tures that had been placed at each one of its poles

From the Vascular Surgery Center Ashford General Hospital, White Sulphur Springs, West Virginia.

I at first, intended to secure these collaterals by excising the sac, but the branches of the branchal plenus of nerves were so densely incorporated in its walls that I could not have dissected them out and detached them without serious damage thereby paralyzing the arm. It occurred to me then that the easiest way out of this awkward dilemma was to seal the orifices of all the bleeding collaterals by suturing them as we would an inestinal wound leaving the sac attached and undisturbed in the wound. This procedure was at once put into effect and the hemostasis was so perfect and satisfactory that it seemed to me strange that no one should have thought of so simple an expedient before

Prior to the introduction of this procedure aneurysms were treated by a variety of methods most of them unsuccessful Compression by various methods (digital band aging instrumental) and the introduction of sclerosing and coagulating agents were em ployed Older operative methods included that of Antyllus (fourth century A D ) which consisted of ligation of the vessel above and below the sac, the evacuation of its contents and the application of an astringent or of packing Anel's operation (1710) consisted of ligation of the proximal artery close to the sac One half century later John Hunter tied the femoral artery in the canal which bears his name for aneurysm of the popliteal artery It was Hunter's idea to bring clotting and eventual cure of the aneurysm and at the same time preserve a collateral circulation. In this

he was highly successful except for the fre quent recurrences which took place through the circulation which he was so anxious to preserve. As has been pointed out by Homans since Hunter's time the preservation of the collateral circulation has become an essential part of every curative procedure It is upon this theory that the Matas endoaneurysmorrhaphy is based Later Brasdor and Wardrop independently ligated the artery or one of its principal branches on the distal side of the sac in an attempt to arrest the circulation through it These procedures were at best a makeshift and were usually per formed only when the position of the aneu ryam prevented other forms of treatment In many instances amputations were per formed for the relief of pain and in order to prevent an almost certain eventual fatal hemorrhage All of these methods with the exception of the Matas procedure were fre quently followed by infection hemorrhage gangrene or failure to cure the condition (Fig 2)

The incidence of multiple injuries in the present war as a result of high explosive shells grenades and antipersonnel mines has led to the production of a larger number of vascular injuries than in any other conflict While small fragments are more apt to cause arteriovenous fistulas many produce false aneurysms as well and to many of these the principle of intrasaccular closure is applicable. In cases in which the ancurvam is large and in which its dissection would un questionably result in damage to surrounding structures such as muscles nerves and other blood vessels, the Matas operation is certainly the procedure of choice. It is difficult to employ in a small aneurysm or where the lesion is accompanied by nerve damage. Here the passage of sutures may damage neural structures and it is better to carry out neurolysis or nerve suture as a single procedure with excision of the aneurysm. How ever the principle of intrasaccular suture may well be applied to those instances of arteriovenous aneurysm in which a large venous sac is present as in Case 8 (Fig. 3)

The endoaneurysmorrhaphy of Matas is simple in conception and if the principles of

its application are borne in mind it is ex tremely easy to carry out Wherever possible a tourniquet should be applied before the sac is opened but if this is precluded by the position of the aneuryam temporary occlusion of the proximal vessel as shown in Cases 1 2 and 3 is of aid in performing the operation in a less bloody field \s soon as the sac is opened and its clot is evacuated search should be made for the openings in the artery into the ancuryam If not readily found temporary loosening of the tourniquet will disclose their position. Usually one or two figure-of-eight sutures of medium silk are sufficient to close the openings but if any bleeding occurs following removal of the tourniquet these can be re-enforced by the placing of other sutures (Fig 4) Actual obliteration of the sac by sutures is difficult because of its friable nature and any suture is apt to cut through When bleeding is controlled and the clot including the lamina tions, is removed the sac will readily collapse and its walls coalesce with the application of a snug elastic bandage. In some instances, the proximal and distal vessels can be dissected from surrounding structures within the sac and individually ligated (Fig. 4) When this is done there is less danger of injuring concornitant veins or neural structures, and the vessels are ligated with more confidence

One hundred and six instances of fale ancuryam have been treated by operation at this hospital in the past 30 months in 61 the Matas procedure has been employed and in 45 some other type of operation usually complete excision of a small sac has been the method used. The location of the lesions treated by intrasaccular suture is shown in Table I.

Results There have been no deaths unthise ries no recurrence and no instance of gangere Sympathetic interruption has not been practiced either before or after operation but it is admittedly a valuable adjunct in increasing blood flow in the presence of ischemia. Carr ful tests for evaluating collateral circulation were noutunely carried out before the operation and when it appeared that the circulation was impaired compression of the vessel proximal to the aneurysm was carried out for some

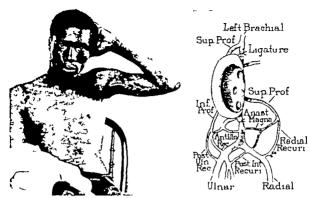


Fig r The original photograph and drawing shown in report of Dr Matas, Philadelphia Medical News, October 27, 1888.

time before operation. In general it was believed that if a period of 3 months had elapsed between injury and operation adequate collateral flow had been established. This feeling has been justified in view of the results

#### ILLUSTRATIVE CASES

CASE I False aneurysm left gluteal artery due to high explosive shell fragment wound incurred February 27 1045 Extraperitoneal temporary of clusion of common flute artery Endoaneurys morthaphy superior gluteal artery June 8 1945 Recovery

This 26 year old soldier received multiple wounds in the region of the left hip from high explosive shell fragments. Bleeding was not profuse Because of abdominal pain and swelling in his hip region and the presence of an abdominal mass which could be palpated by rectum an operation was performed in England on April 12 1045 at which time the left internal Iliac artery was ligated. There was some improvement in his symptoms but in the 30 days prior to admission to Ashford General hospital on June 3 there was increased swelling in the left hip and buttock with severe pain controlled only by morphine On admission there was a large soft mass over the whole left hip region extending as far medially as the sacrum (Fig 5 a) There was a small healed wound in the center of this massive swelling Directly over the mass a systolic murmur could be heard and the mass pulsated synchronously with the heart beat

On June 8 1945 operation was performed under continuous spinal anesthesia. The common iliac artery was exposed through an extraperitoneal in cision and a ligature was passed around it which was not tied and the vessel was temporarily occluded with an artery clamp A vertical incision was then made directly over the center of the aneurysm (Fig. 5 b) and clot measuring 700 cubic centimeters in volume was evacuated With removal of the clot there was considerable bleeding which was found to come from two openings in the superior gluteal artery about 1 5 centimeters apart. Both openings were closed with two figure-of-eight sutures with complete control of the bleeding. The clamp previously placed on the common iliac artery was then removed which caused some bleeding from the muscles and skin which was easily controlled Both wounds were then closed in layers with interrupted sutures of silk. His recovery was without event and the pain previously complained of rapidly disap-

CASE 2 False aneurysm right femoral artery due to high explosive shell fragment wound incurred July 5 1944. Endoaneurysmorthaphy August 13 1944. Recovery

This 25 year old soldier was struck by high explosive shelf fragments on July 5 1044. He received multiple wounds of both legs. While in an evacuation hospital, he had three hemorrhages from wounds of the left leg and on July 17 1044, one was so severe as to require ligation of the left posterior tibila artery and vein. Since the time of the original wounds he had noticed gradual enlargement of the right anterior thigh region which continued to in

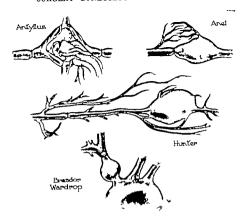


Fig 2. Diagrammatic illustration of the types of operation employed for the treat ment of ancurysms prior to the introduction of endoancurysmorrhaphy

crease in size until his transfer to Ashford General Hospital, August 13, 1044. At that time he was complaining of pain in the right thigh. On examination there were numerous small well bealed wounds in the left leg. On the upper anterior surface of the right thigh there was a large mass 15 by 30 centimeters. The mass was pulsating and over it a harsh systolic murmur could be heard (Fig. 6,8)

Since the mass was steadily increasing in size, an immediate operation was carried out. Through a small transverse incision just below Poupart's ligament, the common femoral artery was identified and temporarily occluded with an artery clamp. An incision 8 inches long was then made along the course of the femoral artery directly over the aneuryam (Fig 6 b) The sac was opened and approximately 1200 cubic centimeters of clot was evacuated Two openings in the femoral artery were closed with figure-of-eight sutures. The vessel was at the bottom of the sac which was bound by Hunter's canal posteriorly and the sartorius muscle anteriorly (Fig. 6,c) The clamp was released from the femoral artery and there was no further bleeding. The deep fascis and skin were closed with inter rupted sutures of silk and a tight pressure bandage applied. His recovery was uneventful and the circulation in his foot and toes remained good

CASE 3 False aneurysm, left superficial femoral artery and false aneurysm left profunds femora

artery upper third due to high explosive shell firment wounds incurred August 29 1944. Eodo-aneuryamorrhaphy left femoral artery upper third Endoaneuryamorrhaphy left profunda femora it tery upper third October 13 1944. Recovery

On August 29, 1044 this 32 year old solder via struck by two shell fragments, both of which entered the anterior surface of the left thigh. The wounds were debruded and closed. About 5 days after bijury a swelling developed in the left auterior thigh region which was diagnosed as an ancurym and he was cruciated to the United States. Shortly siter reaching this country swelling began to increagradually and he was admitted to Ashford Generi Hospital, October 11 1044. At that time, he was complianing of pain in the leg and thigh. There was a massive spherical swelling on the anterior surface of the left thigh, about 10 centimeters below Feoparts Ilgament (Fig 7,3). The mass pubated with each hearthest but there was no thrill. A distinct systolic bruit could be beard over it.

On October 13 1944 operation was performed under spinal anesthesis. A small transverse fiction was said over the femoral artery location was largered and the femoral artery conceived with a small spaced around it. It was then occided with a buildog artery clamp. A longituded first hand to inche long was made over the swelfare along the course of the femoral vessels (Fig. 7).

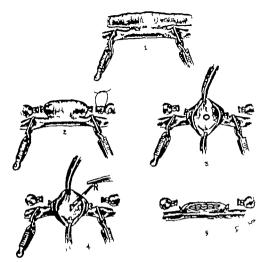


Fig. 3. Steps generally employed in the transvenous or transaccoular repair of an arteriovenous fistula with preservation of the artery

The sac was opened and a clot about 500 cubic centumeters was evacuated. There was brisk bleed ing from an opening in the femoral artery which was easily stopped by pressure with the fingers and was closed with several interrupted sutures of silk. The vessel just proximal and distal to this opening was dissected free from surrounding structures and again ligated.

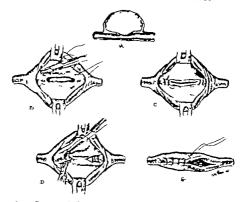
Following this the thigh still appeared tense and firm and, on this account, the fascia covering the adductor group of muscles was incised and another larger aneuryam disclosed. A clot of approximately 1000 cubic centimeters was evacuated and an opening was found in the profunda femoris artery This was closed with 4 interrupted autures of silk. The sac was limited posteriorly by the adductor magnus muscle and laterally by the femur (Fig 7 c) The deep fascia and skin were closed with interrupted sutures of silk, and a snug pressure band age was applied In spite of the ligation of the superficial femoral and profunds femoris artenes circulation in his toes and foot was good at the end of the operation and remained so. The wound bested without difficulty

Case 4. False aneurysm right external illac artery due to bullet wound incurred June 27 1044 Endoaneurysmorrhaphy and proximal ligation of the external iliac artery September 16 1944

This officer received a through-and through 30 caliber bullet wound of the abdonen June 27 104. The bullet entered the right lower quadrant an terority and made its exit just to the right of the 5th lumbar vertebra. Shortly thereafter he was operated upon and several perforations of the small intestine were repaired. His recovery from this operation was prompt except for superficial wound infection which soon healed. He was admitted to Ashford General Hospital August 38, 1944 complaining of pain in the right groin and throbbing in the right lower abdomen.

On examination there was a well healed lower inght paramedian soar extending from the umbilicus to Poupart a ligament. Immediately above Pon part a ligament and underlying the soar was a mass approximately 6 centimeters in diameter. The mass was pulsating with each heart heat, and a systolic bruit could be heard over it. There was no thrill The right dorsalis pedis and posterior tibul pulses could be felt, but both were weak in comparison to the other side. Oscillometric readings were diminished on the right

Operation was performed September 16 1944. The old scar which had been made for the closure of



I up 4 Diagrammatic illustration of endoaneuryamorrhaphy A, Cross section of ar tery with false sac. B S tures are placed to close the arterial openings within the sac. C, Sourses tied. D Occasionally the vessel is isolated and ligated. E, Occasionally the sac is obliterated by further sutures.

intestinal perforation was excised. The peritioneum was dissected upward until the artery above the aneurym could be reached. It was isolated and temporarily occluded with an artery clamp. The artery distal to the aneurym was treated in a similar manner. The sac was opened and two arterial openings in it were closed with interrupted satures of ails. On removal of the clamp there was still some bleeding from the proximal opening which could be controlled only by ligation of the artery proximal to the aneurym. No attempt was made to

TABLE I — LOCATION AND NUMBER OF PA
TIENTS TREATED BY ENDOANEURYSMOR

RHAPITY	
	Casers
Axillary	5
Brachlai	14
Femoral Ifac	_
Peroneal	1
Popliteal	,
Profunda femona	á
Radial	4
Superior gluteal	
Tibial, anterior	3
Tibial, posterior Ulnar	
	_
T tad	6

remove the sac (Fig. 8). The wound was closed in layers. Circulation in the foot and toes was good at the end of the operation and remained so. The patient's recovery was uneventful and be was returned to duty of a limited nature.

CASE 5 False aneuryam, right axillary artery, due to high explosive shell fragment wound incurred May 10 944 Endoaneuryamorrhaphy June 25, 1944 Recovery

This soldier was wounded on May 1 1944. A small shell fragment entered his anternor chest just beneath the right clavvice and made its cit just beneath the right clavvice and made its cit just below the sampula on the right side. Subsequently the developed a hemothorax which necessitated appration. At the time of his injury there was considerable bleeding from the wound in the anterior chest, which was controlled by pressure. Inmediately following the wound he also noticed complete paralysis of the right upper extremity. About Jone I massage and active motion of the right shoulder was begun and shortly after this he noted the appearance of a swelling in the right aniliary and subclavicular region. This swelling gradually in creased in sure until the time of his admission to Ashford General Hospital on June 16 1944.

Examination at that time revealed a large from mass which occupied an area beneath the right clavicle and extended into the avilla (Fig. 9.4) The mass was expanyle and a definite systolic bruit



Fig 5 Case r a, left. Preoperative photograph. Aneuryam of gluteal artery b, Postoperative photograph showing incision.

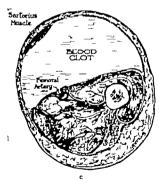
could be heard over it. There was evidence of extensive injury to the nerves of the right arm Pulsation on the right radial artery was faint

On June 25 1044, because of a rapid mcrease in size of the aneutysm, operation was performed. An attempt was made to isolate the subclavian artery above the clavicle but it could not be reached because the clavicle was pushed upward by the aneutysm (Fig 9 b). Since it was believed that the clavicle word the sac wall it was decided

that it was best not to resect it in order to reach the subclavian artery (Fig o c). An incision was there fore made across the axilia and the sac was exposed opened and approximately 2 000 cubic centimeters of blood and cot were evacuated. Bleeding was profuse but was controlled by finger pressure over two openings in the bottom of the sac. These openings were closed with interrupted autures of silk. Because of the necrotic appearance of the sac and the large dead space which could not be obliterated a



Fig. 6. Case 2 a, Preoperative photograph. Aneurysm of right femoral artery b, Postoperative photograph showing incisions. The upper transverse incision was made



for temporary occlusion of the femoral artery c, Cross section illustration showing relative size and position of aneurysm



Fig. 7 Case 3. a, Preoperative photograph. Double aneurysm of femoral and profunds femoris arteries. b, Postoperative photograph showing incisions. The

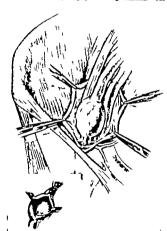
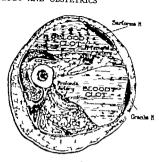


Fig. 8. Diagrammatic illustration showing operative procedure used in Case 4.



upper transverse incision was made in order temporarily to occlude the common femoral artery c, Cross sectos illustration showing relative size and position of ancurrens.

drain was left in the wound for 24 hours. His recovery was uneventful. The hand and fingers have remained warm. Two months later nerve repair of the radial, median, and ulnar nerves was doze—the

present there is evidence of returning nerve function.

CARE 6 False ancuryum, right brachal artery
due to mortar shell fragment wound incurred Argest
6 1944. Endoancuryamorrhaphy right brachal
artery lower third December 13, 1944. Recovery

This ay year old soldler was wounded by mortise shell fragment on August 6 1914. The fragment entered the posterior surface of the foream just below the clubow and caused a compound fracture of the ulns. Bleeding was slight and controlled by a pressure bandage. At the same time he variationed in jury to the median nerve which was partial and from which he gradually recovered. At an excust too hospital in England the wound was debudels, a plaster splint applied and he was returned to the United States. With the removal of the splint, as an entry and of the plant and the plant of th

General Hospital on December 3 1944.

On admission he complained of pain and throbling senation in his right hand. Examination revealed a partial paralysis of the median nerve which was indicated by weakness of the moster supplied by that nerve but which was said to be improving. Just datal to the right antecubait space was a fluctuant mass about 5 centimeters in diameter (Fig. 10.a). There was no thrill, but a systolic brait could be heard over it. Skin tempera although the right radial pulse was diminished as comparison with the left.

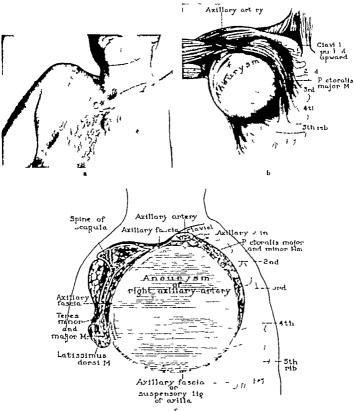


Fig. 6. Case 5. a, Preoperative photograph. Aneurysm of axillary artery b The approximate anatomic position of the ancurysm. c. Cross section showing relative size and position of ancuryum.

On December 13 1914 operation was done under pentothal sodium anesthesia. A blood pressure cuff was used as a tourniquet on the arm. An incision 5

aneuryam and the sac uncovered (Fig. 10 b). A laminated clot together with fresh clot was evacu ated. At the bottom of the sac the brachial artery centimeters in length was made directly over the was easily located. There were two openings in it r

centimeter apart. Both were closed with inter rupted sutures of silk. When the tourniquet was removed there was no abnormal bleeding. The deep fascia and skin were closed with interrupted sutures of allk. No attempt was made to obliterate the sac other than to apply a snug pressure bandage Circulation in the hand and fingers was good at the end of the operation and remained so Function of the median nerve returned without further operation.

CASE 7 False aneurysm left radial artery upper third due to high explosive shell fragment wound in curred October 7 1944. Endoaneurysmorrhaphy June 16 1945 Recovery

This 23 year old soldier was wounded in action October 7 1014. He suffered wounds of both upper extremities, the abdomen, and chest. He was oper ated upon within a few hours for perforations of the fleum and liver from which he recovered without difficulty After returning to the United States in May the patient first noticed a pulsating tumor of the left forearm, and for this he was admitted to Ashford General Hospital on June 8 1945 On examination there were noted numerous healed scars of both upper extremities chest, and abdomen On the lateral volar aspect of the left forearm there was a circumscribed pulsating tumor about 6 centimeters in diameter. Over this mass a systolic bruit could be heard. The skin temperatures of the fingers of both hands were normal and symmetrical The left radial pulse was weak. There was no associated nerve minry (Fig. 11.a and b)

On June 16 1045 operation was performed under pentothal sodium anesthesia. An inflated blood pressure cuff was used as a tourniquet on the arm. A longitudinal incision 5 centimeters long was made

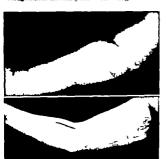


Fig. o. Case 6. a., bove, Preoperative photograph. Ancuryon of brachial artery b, below Postoperative photograph showing incision.



directly over the tumor mass which was easily ancovered. The sac was opened and some old and freshly organized clot was evacuated. The radal artery which was at the bottom of the sac had been partially divided producing an upper and lower opening each of which was closed with sutures of silk. The tourniquet was then removed and there was a slight oozing which was closed with another suture of silk. No attempt was made to obliterate the sac. The deep fascia and skin were closed with interrupted sutures of silk and a pressure bandage was applied from the fingers to the elbow. The cir. culation of the fingers was good at the end of the operation and remained so

CASE 8 Arteriovenous ancuryam, left external carotid artery and internal jugular vein with fabe venous sac, due to shell fragment wound incurred September 23 1944. Paralysis of left recurrent laryngeal nerve. Ligation and division of right ex ternal carotid artery Ligation and division of left



Fig 1 Case 7 a, above, Preoperative photograph. Aneutysica of radial artery b, below Postoperative photograph showing incision.

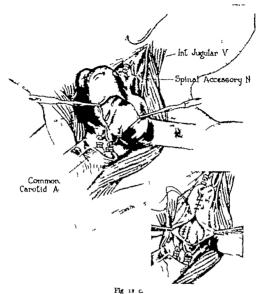


Fig 12 Case 8 a, Preoperative photograph Arteriovenous ancuryms of external

carolid artery and internal fugular vein b Postoperative view showing incision c, Repair by ligation and division of vessels and transaccular closure of arterial openings.

common carotid artery and internal jugular vein Ligation and division of distal arterial branches Endoaneuryamorrhaphy Recovery

This 30 year old soldier was wounded in action by a mortar shell fragment which struck the infra orbital region of his cheek. He was unconscous for approximately 10 days during which time a trache otomy was performed because of respiratory difficulties. The tracheal tube was removed after 2 weeks. Soon after the injury a mass was noted in the left side of his neck and, on recovery of consciousness, he moticed that the left eyeld drooped and that he was hoarse. He was returned to the United States and admitted to Ashford General Hospital on December 10 1014

Examination revealed a small wound just below the Examination revealed a small wound just below the left sye. Roentgenogram showed a foreign body in the left suprascapular region. There was definite Horner's syndrone on the left and paralysis of the left recurrent taryngeal nerve In the left side of the neck extending from the ear almost to the clavicle was a mass of dilated vessels which was easily compressible (Fig. 12,2)

A harsh continuous bruit accentuated in systole could be heard over the mass and was transmitted to the scalp down the left arm and to the left scapular region. A continuous thrill could be felt over the whole left side of the neck. The bruit and thrill were easily eliminated by compression of the common carotid artery. The mass in the neck became much less tense on obliteration of the artery and the pulse rate fell from 92 to 76 and the blood pressure changed from 110/70 to 110/84. Diagnosis of an arteriovenous fistula of the external carotid artery and internal jugular vein together with false venous acc was made.

Because it was apparent that considerable blood flow to this fistula came from both sides of the neck, preliminary ligation and division of the external carotid artery of the right side were done on Decem ber 28 1944. On January 4, 1945 the final operation was carried out under pentothal sodium anesthesia. An incision was made along the anterior border of the sternomastord muscle from the angle of the law to the sternum (Fig. 12 b) and the muscle was retracted laterally. This exposed a tense and dilated venous sac. The common carotid artery was ligated and divided which relieved this tenseness to some extent. By careful dissection about the sac and retraction laterally three branches of the external caroud artery distal to the fistula could be ligated and divided. The internal jugular vein distal to the fistula was ligated. The internal jugular vein on the proximal side of the fistula was then ligated and divided. When this was done it became apparent that the fistula with the false sac could not be completely removed and therefore the sac was opened and the clot evacuated. There was some bleeding from three openings in the sac which were endently branches of the external carotid artery Bleeding from them was easily controlled by the passage of interrupted autures of silk. A portion of the sac wall was excised and the remainder was imbricated over the previously closed arterial openings (Fig. 11.c) The deep fascus and skin were closed with inter rupted sutures of silk. The operation required 616 The patient's condition throughout the operation was good and there was no difficulty in his breathing Following the operation there was considerable difficulty in his breathing and swallowing but from this he recovered gradually within a period of a week. A month later he was discharged from the service with considerable improvement in has hourseness but none in sympathetic paralysa.

# WAR INJURIES OF THE CHEST

EARLE B KAY M D F.A.C.S Major M C. A US and RICHARD H MEADE Jr M D F.A.C.S Le Col M.C. A.U.S

AN ANALYSIS of a large series of cases having war injuries of the chest as observed in an Army Chest Cen ter in this country seems desirable Reports on the early phases of chest injuries have been published (r 2) The present anal ysis represents a study in retrospect of the first 500 consecutive patients in 2350 such patients seen. The material for this study was obtained from a careful review of the patients field medical records records of previous hospitalizations and serial roentgenograms as presented by the patients at the time of admission to a chest surgical center in the Zone of the Interior The course of such chest injuries is viewed from the point of vantage of their last hospitalization. These cases were analyzed as to the character of the original mury initial treatment complications and subsequent treatment. An evaluation of oper ative and conservative therapy is made. Clos ure of thoracotomy wounds with and without drainage is discussed in relation to postoper ative morbidity. Other aspects of the treat ment of war chest injunes have been thor oughly covered in previous papers and will not be repeated Such an analysis as this is felt to be of value in the treatment of similar injuries in the future. The condition of the patients upon arrival in this country as well as the more important phases of late treatment is described

The lowered mortality from chest wounds in this war has been due to their excellent primary care. Chemotherapy and penleillin have aided but in themselves are no substitutes for sound surgical judgment. In some cases they may be detrimental to the partient a welfare if dependence on their protective ability leads the surgeon to take unneces sary raks.

Even though the mortality has been remarkably decreased from that in previous

From the Thoracic Surgery Section, Kennedy General Hospital, Monohita Temperature

wars the morbidity could be further reduced Several factors have contributed to the present morbidity. Among the factors to be discussed are (1) the delayed or ineffectual aspiration of hemothotaces () the tendency to close contaminated chest wounds primarily without drainage (3) ill timed or univise thoracotomy and (4) the tight closure of sucking wounds of the chest in the face of underlying bronchopleural fistulas.

The early treatment of chest wounds should be concerned primarily with the correction of the altered cardiorespiratory mechanism con tributing to the shock of the patient and with the prevention of infection. There are only a few chest conditions which require immediate surgical intervention. These are large suck ing wounds of the chest wall tension pneumo thorax and uncontrollable bleeding. How ever many emergency operations have been performed where these conditions have not existed Many chest in lunes fare better when they are treated by repeated effectual thoracenteses. The type of injury as well as the nature of the offending agent is of importance in the decision as to immediate thoracotomy

Certainly in explosive injuries causing large sucking wounds bemorrhage and extensive laceration of the lung with retained spicules of rib clothing and metal thoracotomy is indicated. However these comprise only a small proportion of the injuries seen.

## ANALYSIS OF THE INITIAL CHEST CONDITIONS

The causative agent in the majority of cases was either shrapnel or shell fragments. A minority of the injuries was due to bullets Table I lists the types of the initial conditions in 500 patients.

Hemothorax or bemopneumothorax of some degree occurred in 455 of the 500 patients with chest injuries. It is interesting to note that 19 patients with either perforating or penetrating wounds of the chest escaped without devel

TABLE L-ANALYSIS OF INITIAL CHEST CONDITIONS\*

Condition	h efces
Hemothorax	455
Significant foreign bodies	1733
Sucking wounds	36
Combined chest-abdominal a ounds	75
Bronchopleural fistulas	45
Penetrating or perforating injuries only	73
Large contusion	ž
Pericarditis with effusion	š
Tension pneumothorax	0
Bhast injuries	ě
Hematoma of the hing	i
Fractured aternum	i
I furnes to the esophanus	1
Injuries to the traches	ž

The occurrence of some of these mileries may have been higher be no reference was made t them. the records available

oping any detectable hemothorax. There were 211 retained foreign bodies. There were many more than this noted by roentgen examination but their size and location were such as not to be of clinical significance. One hundred and thirty-six sucking wounds of the chest wall were of such a degree as to require immediate closure There were 62 extensive lacerations of the lung and 45 clinically significant bron chopleural fistulas. Transitory fistulas must have been present in other cases but appar ently were not complicating factors. There were 75 combined chest-abdominal injuries. In several instances multiple abdominal organs were involved. The organs injured in the order of incidence were liver 40 spleen 16 stomach 15 kidney o small intestine and colon 7 The other initial injuries are self ex planatory as noted in Table I

The good results being obtained in patients with war chest injuries are due to the excellent organization providing the best care from the onset by the medical corps men and front line surgeons. The immediate use of morphine tetanus toxid plasma transfusions sulfon amides penicillin and followed when indicated by prompt débridement thoracentess and exploratory thoracotomy have saved many lives that would otherwise have been

Four hundred and fifty five patients had some degree of hemothorax, many of which were associated with other conditions such as sucking wounds lacerated lung tissue and retained foreign bodies. Others were uncom

TABLE IL.—TREATMENT OF 455 PATIENTS WITH HEMOTHORAX

	Nember	Patients by	
	a/ cmm	Ne.	Process
I Group treated by theracentesis	115	ĮĮ.	76 E
Eliminating parients of broad-appears fateles he became infected	ц	.,	
<ul> <li>Eliminating 13 patients toucke quartery tapped ( -e aspurations) to became inferted</li> </ul>			1
Memmating groups and b	301	1	•
LI Group treated by operation	54	ró	41
III Group with no defaute treatment	7	,,,	U
Elization to go the plant of the broadchopietral fatules who became laterted		4	נ זו
b Elementing as partients orth small hamothorners which besied spectrassurity and 6 patterns the branchesterns for the se-			

plicated In a number it was impossible to determine the condition of the intrathorack organs prior to operation

The most severely injured patients had thoracotomies. In other instances, patients with less severe injuries were also operated upon In a comparative analysis in retrospect from material obtained from the field medical records and serial roentgenograms it is diffi cult properly to evaluate all of the factors confronting the attending surgeon and influ encing his decisions as to the type of therapy employed In discussing results obtained in the treatment of hemothorax by various methods bemothorax alone will be considered apart from the accompanying conditions. As may be noted in Table II 225 of the 455 patients with hemothorax were treated conservatively by thoracenteses 156 had thora cotomies and 74 had no definite treatment

Results obtained with and without thoraces term. The effectiveness of adequate repeated thoracenteses in the treatment of hemothorax is emphasized by the data in Table II. It is important to note that only 16.8 per cent of hemothoraces aspirated became infected, in comparison to 459 per cent of those not aspirated. The difference in the results obtained is even more striking if patients with bronchopleural fistulas and inadequate thora



Fig. 1 a, A hemothorax secondary to a perforating wound of the right chest b, The chest a days following thoracotomy and hemostasis. No thoracotomy drainage

was employed because the amount of contamination was thought to be minimal. c, A fluid level in the right hemithorax indicative of a postoperative empyema.

centeses (only 1 to 2 aspirations) are climinated from the first group. An incidence of infection of 6.9 per cent results in patients adequately treated. This may be compared to the second group in which thoracentesis was not used. If 6 patients with bronchopleural fistulas are eliminated and 34 patients with only small collections of blood in the pleural space are not considered an incidence of infection of 70 per cent results.

Operative versus conservative therapy in ini tial chest injury Considerable advance has been made in thoracic surgery since the last war The lowered mortality from chest wounds is in part due to the ability of present day surgeons to cope successfully with intrathorac ic operations. However, as previously stated there are only certain indications for imme diate thoracotomy The presence of a pene trating or perforating wound of the chest in itself is not an indication. Many operations designed to stop hemorrhage or to prevent infection have instead been followed by these as complications (Fig. 1) This is particularly apt to be true if the chest is closed without dramage

One hundred fifty-six patients had initial thoracotomy débridement hemostasis and repair of the injured tissues within the first 24 to 48 hours. Of these 156 cases 48 7 per cent were complicated by an infected hemothorax (Table II) 30 per cent by hemothorax relieved by thoracenteses and 6 per cent by

organized hemothorax According to these figures the operative group fared much worse than the group followed conservatively with thoracenteses in which only 168 per cent of the patients required additional treatment It is realized that the operative group included the severe miuries in which operative therapy was mandatory and the likelihood of complications great if operation had not been done but it also included patients who would have done as well or better on conservative therapy alone Of the 156 patients having early thora cotomies in 66 no obvious indication for immediate operation could be found in their field medical records. The majority of these had retained foreign bodies in addition to a hemothorax. Sixteen patients were found at the time of operation to have lacerated lung tissue. A number of these patients had their wounds closed without drainage and did not receive adequate postoperative thoracenteses Many of these patients developed infection which required drainage (Fig. 2) No mention is made of chemotherapy (sulfonamides and penicillin) for this was employed in all groups

Comparison of results obtained in patients having thoracotomies closed with drainage and without drainage. There were 189 patients in all who had thoracotomies prior to arrival in this country. This includes 33 patients who were operated upon at a later date in addition to the initial 156. In 81 patients wounds were closed with drainage and in 108 without. In



Fig. 8. Roentgemograms illustrating penetrating boilet a couri of the left chest. The builet is noted in the left ages. An immediate thorsontomy was performed for herostasis and to remove the bullet. The builet was so located in the mediastimum as to percent its removal. The chest was closed without drainage. a, A postoperative hemothorar. This later became infected and was treated by open thorsectomy drainage by The resulting total embrema state.



Fig. 3. Roentgenograms Illustrating penetrating ound of the right chart resulting in retained shell fragment and a hemothora: a. Condition of chest prior t operation. b. A postoperative previous/boxas econdary to a broochopleural fistina. The wound was closed without drahage and an emprema resulted that required drahage on three consistent.

those closed with drainage 82 7 per cent healed without requiring secondary operations in contrast to only 43 5 per cent of those closed without drainage

The patients who were drained and yet be came infected had the most severe injuries. There was an average length of healing in the first group of 10 weeks as compared to 14 weeks in the second group. Even though 43 5 per cent of the natients closed without drain

age healed primarily the higher incidence of postoperative infection requiring secondary operations and the longer period of convalescence in those who became infected makes this type of treatment less desirable than the use of postoperative drainage

Conditions under which a surgeon must care for the wounded at the battlefront do not always allow him to supervise the post operative care for a sufficiently long period of

TABLE III.—THORACOTOMIES CLOSED WITH AND
WITHOUT DRAINAGE

Chand

	with drainage	without drainag
Number of cases	81	108
Percentage healing without secondary operations Percentage requiring secondary	82 7	43 5
operations Average duration of bealing	17 3 10 weeks	56 5 14 <del>neeks</del>

time, nor allow the thorough aspirations of a hemothorax before the patient must be evac uated elsewhere. It seems far safer therefore to employ routinely water seal drainage after thoracotomies. This would be followed by less risk to life and lowered morbidity and would require considerably less of the surgeon s time and attention than would repeated post operative thoracenteses. During transportation the thoracotomy tube could be clamped and the bottle temporarily disconnected or a flapper type drain used

Foreign bodies Of the original 211 retained

foreign bodies, 47 were removed at the time of the original operation and 33 after an interval of several weeks. In many patients the foreign body was removed incidental to débridement hemostasis and repair of lacerated lung tissue while in others the operation was designed primarily for the removal of the foreign body. In this latter group the chest was frequently closed without drainage because the extent of injury was not great. In the process of removing the foreign body bronchopleural fistulas frequently were created and these were not adequately repaired, as demonstrated in Figure 3. The incidence of postoperative in fection in this group alone was 30 per cent

There is considerable difference of opinion as to the clinical significance of metallic foreign bodies and the indications for their removal. The chief reason for removing pul monary foreign bodies is the possible development of hemorrhage or infection. Of the entire group only 8 were later associated with hemoritysis 7 with lung abscesses 6 with pneumonitis and 8 with draming sinuses. These conditions occurred for the most part within 2 to 4 weeks following injury. Those foreign bodies associated with infection were trivially found at operation to be intermingled with other debris such as particles of clothing

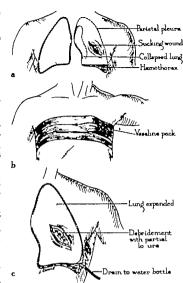


Fig. 4. Diagrammatic illustration of the emergency treat ment, by by packing with vascine game and tight application of adhesive tape to sucking wound illustrated in ac, Diagrammatic demonstration of the definitive treatment of sucking wounds of the chest wall by debridement and partial closure including the pleurs and muscle layer but leaving subcutaneous adligues tissue and skin open. An intercostal water seal thoractomy tube is inserted to drain the inevitable hemothorus.

and dirt which probably was the cause of the infection rather than the metallic foreign body itself. Only experience over a longer period of time will enable the surgeon to evaluate the late results of residual foreign bodies and the advisability of their removal.

## SUCKING WOUNDS OF THE CHEST WALL

There were many more sucking wounds of the chest wall than the 136 listed but these were small enough to be of no clinical signifiicance and responded promptly to either packing or débridement and primary closure



lig 3 Serial roentgenograms a, \ early affected hemothorax with mediantinal shift to the opposite side b. \ \ t tal residual empyema space following early open

thoracutomy dramage. The appearance of the healed best following continuous suction 1 serapy over period of 4 months.

There was between 5 to 10 per cent infection in such wounds closed primarily. In several instances tension pneumothorax developed after closure of the sucking wound when under lying bronchopleural fistulas were not recog nized In the larger sucking wounds of the chest wall emergency closure by packing was followed almost universally by débridement and primary closure Fifty-seven per cent had thoracotomies in addition to closure of the sucking wounds Several patients with suck ing wounds had only partial closure of the chest wall following débridement in conjunction with intercostal water seal drainage as demonstrated in Figure 4. The convalescence of these patients was the least complicated of all

INTURIES TO THE ESOPHAGUS AND TRACHES There were a injuries to the cervical esonaagus and 2 to the upper end of the traches m the first 500 patients analyzed Eight additional cases have since been seen. No injury to the thoracic esophagus was noted even though in a number of instances ragged shell fragments have lodged in the posterior mediastinum close to the esophagus (Fig 8.d) The high mortality resulting from mediastinitis and hemorrhage associated with such injuries accounts for the few patients seen in the Zone of the Interior Three patients had immediate tracheotomies and 4 patients gartrostomies within 4 to 10 days time All of these injuries were complicated by esophageal fistulas and abscesses requiring drainage



Fig. 6. Roentgenograms demonstrating a, an infected organized hemothorax and b, the postoperative result following decortication.

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## TABLE IV —COMPLICATIONS (CHEST) Complications

N Infected hemotherax Hemotherax 47 Oceanized hemothorax 49 Bronchooleural fistula 36 Subohrenic abscess ĭı Preumonitis and lung abscess about foreign body ΙI Tension pneumothorax Pneumonitis and abscess at site of hematoma Infected costal cartilage Atelectaria Pulmonary infarct Bronchopneumonu Hemoptysis secondary to foreign body Pericarditis with effusion Suppurative pericarditis Pericardual tamponade Esonhageal fistula with paracsophageal abscess Diaphragmatic hernia

Two patients developed esophageal stric tures requiring dilatation. The tracheotomy tubes were removed within a to 4 weeks with no further difficulty in breathing Four of the 6 patients also had recurrent larvngeal nerve paralysis that persisted. The eventual out come in these 6 patients was satisfactory

## COMBINED CHEST ABDOMINAL INTURIES

The majority of the chest abdominal in juries were successfully treated through a transthoracic approach Others were explored through the abdomen In case of doubt as to the extent and location of the abdominal injury the abdominal approach allows better exploration The diagnosis of a concomitant abdominal injury is frequently difficult to make for diaphragmatic and intercostal irri tation frequently give abdominal pain ten derness and muscle spasm. In combined injuries the abdomen deserves primary atten tion if the chest is stable. Only when large aucking wounds of the chest wall tension pneumothorax pencardial tamponade or rapidly developing hemothorax associated with shock not relieved by conservative therapy are present should the chest condition be given first consideration Intratracheal anesthesia should be employed in all operations for combined chest-abdominal injuries regardless of approach for if there is a tear of the diaphragm atmospheric air from the abdominal incision may cause collapse of the lung on the affected side and even tension pneumothorax When injuries to the liver are explored transpleur



tion of bronchopleural fistula, narrow empyema tract, and drainage site some distance from fistula.

ally both the subphrenic and pleural space should be drained. When this precaution is not taken bile empyema and subphrenic abscess are frequent developments. Bile em pyema occurred in 14 instances The most significant ones followed closure of the wound without dramage

The liver appears to tolerate the presence of metallic foreign bodies very well. Liver abscess secondary to a metallic foreign body was not noted in this series even though biliary drainage was present following injury in a number of patients. In injuries to the lower chest careful urinalysis for the presence of blood is indicated. Intravenous pyelograms have occasionally illustrated defects in the renal pelves secondary to such injuries

Complications-chest Infected hemothorax was the largest single complication three per cent of 144 cases were secondary to thoracotomies Many of the thoracotomy wounds were closed without drainage and because of the necessity of evacuation to other hospitals thoracenteses were often delayed or infrequent Forty seven patients developed postoperative hemothorax All of this group responded favorably with repeated aspira tions Forty nine patients developed organ ized hemothorax. Twenty of these had had only one aspiration or none at all and 7 had only two aspirations o followed previous ther acotomies

The majority of the 36 bronchopleural fistulas were secondary to severe injuries 8 were secondary to removal of foreign bodies and 6 were noted only after the development of



Fig. 8. Acentgenograms demonstrating foreign body associated with poeurostic and blowes. b and foreign bodies I contact—th large blood vessels, and dia foreign body in contact is the the conductors.

empyema. Leven patents had roentgen evidence of either pneumonitis or lung abscess at the site of foreign bodies. In 4 patients pul monary hematomas became infected liquefied and required drainage. The other complications are self-explanators as noted in Table IV. The surgical treatment of the complications is tabulated in Table V as follows.

## TABLE A -TREATMENT OF COMPLICATIONS

Treatment	\ <b>4</b> a
Thoracenteses	47
Drainage empyema	5
kedrain ge empyema	47
Decerticat on	42
Choure brook by deural fietula	9
Thamage subphren becess	2
kerals of duphragmatic bernis	3
Dealmage lung buce	3
Pericardal perat res	1
Drainage suppurate persond to	1
Designed personal all tampoord	
keyether of extrachendratis	4

## EMPTEMA

Eticlogy of emprema One hundred lifty-ore patients developed empyema secondary to the chest injury. In some several factors appeared to contribute such as bronchopleural hatula or extensive injury with consideral contamination in patients whose wounds were closed without drainage following operation. In 41.2 per cent the cause was directly outcerned with some a pect of the injury such as its seventy exten we contamination or lic eration of the lung with bronchopleural fe In \$5.8 per cent failure to prom's adequate aspiration of a hemotherax in the nonoperative cases or postoperative water seal drainage in the operative group wa respentible either wholly or in part for the development of the empyema. Of the et a per cent 314 per cent had theracotemps

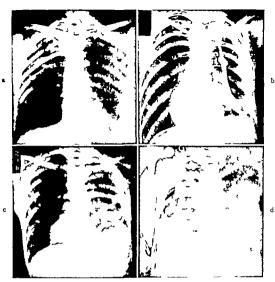


Fig 9 Roentgenograms demonstrating a, a lung abscess associated with a metallic foreign body. At time of operation clothing and other debrus were found in the abscess cavity b. A large foreign body partially embedded in the lung partenchyma and protrading into the empyema cavity c and d, Large foreign bodies in the lung partenchyma associated with empremas-

without postoperative drainage 9.4 per cent too early removal of the thoracotomy tube and 18 per cent inadequate thoracenteses (o-2 spirations). No patient operated upon de veloped an empyema of clinical aignificance as a result of water seal drainage. This analysis suggests that the incidence of empyema could have been appreciably reduced if adequate water seal drainage had been provided. The average interval prior to drainage of the empyema was 334 weeks.

Condution on admission to chest surgical center Certain aspects of value in the late treatment of these conditions will be discussed. The majority of the chronic empyemas are adequately drained and in a state of healing when admitted. Those that are not adequately

drained are redrained Most are either small or moderate in size During the early phases of the war there was a tendency to perform early open thoracotomy for infected hemothorax Total empyema spaces were a fre

TABLE VI.—CONDITION ON ADMISSION TO CHEST SURGICAL CENTER

Condition.	No of cases	Percentage
Healed	314	628
Chronic empyema	82	16 4
Fore gn bodies	49	98
Bronchopleural fistula	36	7 2
Draining sinus	<b>z</b> 6	5 2
Organized hemotherax	12	2.4
Hemothorax	9	1 B
Diaphragmatic hernia	4	o 8
Esophageal fistules and para		
esophageal abscess	3	06
Pericardial effusion	1	0.4





Fig. 11 Photographic illustrations of a decortication a, An organized hemothorax after evacuation of the fibrin on man from the pleural space showing the organized

fibrin on visceral pieura b Easily obtainable cleavage plane between fibrous encasement and visceral pieura, c, Re-expansion of lung with positive pressure anesthesia.

moved if readily obtainable at the time of drainage (Fig 9). If not then they are removed at a later date if causing a drainage mus. Foreign bodies causing hemoptysis or intercostal pain are removed if it can be shown that the foreign body is directly responsible (Fig 10).

Only occasionally the psychological factors of fear and pain are such as to indicate the removal of a foreign body that would not otherwise be removed. Foreign bodies when unaccompanied by other débris have been found at operation to be associated with sur prisingly little reaction and no infection Those in contact with large blood vessels have been well encapsulated in fibrous tissue Because of these observations the tendency has been to remove fewer and fewer foreign bodies and then only when indicated Tetanus toxoid is always given preoperatively as well as peni cillin which is also continued for 4 to 5 days postoperatively At the time of admission to this center 4 patients still had either pneumonitis or lung abscesses 3 had hemoptysis and 4 had draining sinuses The onset in most of these was shortly after injury No evidence of infection has as yet been seen to develop in those patients having retained foreign bodies shown roentgenologically to be free of infec tion for as long as 2 to 3 months Two patients had gross hemoptysis 6 months to a year after injury

Decortication in cases of organized hemothorax has enjoyed considerable popularity and is indeed responsible for the amazing results obtained in many individuals who would otherwise have suffered from a chronic fibrothorax In 8 per cent of the hemothorax patients clotting of the blood occurred to the extent of preventing evacuation of the blood by aspiration. In neglected cases the lung is compressed against the mediastinum by an encasement of organized fibrin which prevents the lung from re-expanding immobilizes the diaphragm and lines the parietal surface This layer of fibrin in some instances may be 1 5 centimeters in thickness. The pleural cavity usually contains a jelly like fibrinous mass The operation of decortication as shown (Fig 11) consists of developing an easily obtainable cleavage plane between the fibrous encasement and the adjacent visceral pleura pericardium diaphragm and chest wall from which it can be easily separated allowing reexpansion of the lung When this layer is first incised as shown in Fig 11 b the line of incision quickly gaps and lung tissue herniates through the opening. The best results are those done early (4 to 6 weeks) After the lung has been allowed to remain collapsed for

3 months or more some fibroals of the paren chyma frequently takes place causing delayed postoperative re-expansion

#### SUMMARY

An analysis of 500 consecutive patients with war injuries of the chest is presented The course of these miuries is viewed from the point of vantage of their last hospitalization The material for the study was obtained from a careful review of the patients field medical records records of previous hospitalizations and serial roentgenograms as presented by the patients at the time of admission to a chest surgical center in the Zone of the Interior The character of the original injury initial treatment and complications are described An evaluation of operative and conservative therapy of chest injuries is made

Closure of thoracotomy wounds with and without drainage is discussed in relation to postoperative morbidity The condition of the patients upon arrival in this country as well as the more important phases of late treatment is described

The effectiveness of repeated thoracentesis m the treatment of 225 patients with hemothorax is apparent in the incidence of infection of only 16.8 per cent as compared to an incl dence of infection of 45 o per cent in 74 pa trents not aspirated

Early thoracotomies employed in the treat ment of chest injuries designed to stop hem orrhage or to prevent injection have frequently been followed by these as complications This is particularly apt to be true if the chest is closed without drainage Of the 156 mittal thoracotomies 48 7 per cent were complicated by an infected hemothorax, 30 per cent by a hemothorax and 6 per cent by an organized hemothorax The operative group includes the more severe injuries and the likelihood of complications is greater, but it also includes a number of patients that could have been treated as well by conservative means

The advantage of postoperative water seal drainage over primary closure of thoracotomy operations without providing drainage is demonstrated by an incidence of healing without requiring secondary operations of 82 7 per cent in patients drained in contrast to only 43 5 per cent in those not drained. Conditions under which a surgeon must care for the wounded at the battle front does not always allow time to supervise the postoperative care for a sufficiently long period of time nor allow the thorough aspirations of a hemothorsx before the patient must be evacuated elewhere It seems far safer therefore to employ water seal drainage routinely after such thor acotomies.

The treatment of foreign bodies sucking wounds of the chest wall injuries to the exophagus and trachea as well as combined chest abdominal injuries is discussed

The late treatment of chronic empyems, bronchopleural fistulas intrathoracic foreign bodies and organized hemothorax is described.

REFERENCES I. D'ABREU A. L. LITCHFIELD, V W and HOSSON, C.J. Lancet, Lond, 1944, 3 97 2. NICHOLSON W F and SCAUDERS, J G. Lancet, Lond-

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## INTRAVENOUS GELATIN FOR NUTRITIONAL PURPOSES

# Clinical and Experimental Studies

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ELATIN is an incomplete protein since it does not include all the amino acids essential for normal growth and reproduction. Recently certain gelatins have been employed in the treatment of shock as a plasma or 'blood substitute. The following report is concerned with animal experiments and clinical studies employing glatin as a parenteral introgenous nutriment.

The gelatin employed has been previously described <sup>1</sup> It was prepared from pigakin autoclaved several times and made up into an <sup>3</sup> per cent solution in normal saline

As the purpose of this study was to deter mme whether intravenous gelatin is utilized for synthesis of the organism's own proteins (plasma proteins in particular) certain con trol studies were necessary. Since gelatin is a colloid, the first step was to observe the effects of repeated intravenous injections of an inert non nitrogenous colloid Gum acada, 6 per cent in saline was injected daily intravenously in 2 dogs weighing 77 and 71 kilograms respectively. The quantities injected varied from 200 to 400 cubic centimeters. The hematocrit readings prior to injection were 30 per cent and 35 per cent, respectively After 6 days these values fell to 14 per cent in each instance The preliminary plasma protein levels were 5 1 and 5 65 grams per cent re spectively, and after 8 days' injection fell to 2 27 and 1 57 grams per cent, respectively, and were maintained at these levels by repeated injections. The reduction in levels of circulating plasma proteins paralleled roughly the reductions in hematocrit readings. Brom sulfalein liver function test in 1 animal after 13 days injection was within normal limits These studies were interpreted to indicate that an inert colloid could be injected to dilute

Brunschwig, A., Corsin, N. and Johnston, C.D. Assa, Surg., 945, 2 St. 2018-2042. From the Department of Surgery University of Calcuso.

nee an mert conoid could be injected to dutite

the blood plasma and that plasma protein levels were correspondingly reduced because outpouring of plasma from the tissues into the circulation if it did occur at all, was insufficient to elevate the plasma protein level above that expected from the dilution

Another control observation was the deter mination of the dilution effects of gelatin in jected daily as has been described. It was not anticipated that gelatin alone would suffice as an efficient nutriment since it does not include all essential amino acids. It was necessary however to determine if gelatin repeatedly injected would afford hemodilution as did gum acacia. The data obtained in a animals are summarized in Table I. Prior to these experiments the animals were depleted of protein by maintenance on a low nitrogen dieterm of the diet contained a man nitrogen.

The results show that hemodilution result ing from repeated injections of gelatin is not comparable in degree with that observed following gum acacla, in that the latter probably remains in the circulation for a longer period

Still another type of control observation carned out was the demonstration that gelatin injected intravenously was not inert but was at least partially catabolized by the organism For example in a patient receiving nothing by mouth and only saline solution by vein the average daily ures nitrogen excretion was 2 8 grams for 3 days when 11 grams of gelatin were injected each day for 3 days, the average daily urea nitrogen excretion was 7 5 grams and on the subsequent 3 days when saline only was again injected the urea nitrogen excretion was 3 2 grams per day Explanations other than that the increased ures excretion was derived from catabolism of some of the gelatin would appear farfetched

In a study to determine the utilization of a given nutriment administered intravenously it is necessary to determine its efficiency when Patient K., No 344180, female, aged 14 years, convalescent from a radical colectomy and enterce tomy performed for extensive regional enterlits was markedly depleted before operation due to severe diarrhes.

During a period of 7 days observation the following facts were noted

Average daily nitrogen in diet—grams Average daily nitrogen (intravenous)	11
gristin—grams Average daily calories in diet Average daily total nitrogen intako—grams Average daily nitrogen excretion—grams Average daily nitrogen balance	812 23 14

The above depleted convalescent patient was enabled rapidly to achieve an average daily positive nitrogen balance of 7 5 grams. Seven months after operation she remains well

Similar data in another patient again indicate the value of intravenous gelatin in increasing nitrogen retention. A period of 6 days observation while gelatin was administered was followed by a period of 5 days when gelatin was not injected

Patient R., No. 305306 female, aged 35 years, a convalencent from excision of the head of the pancross and duodenum for carcinoma of the former Six months after operation patient is well.

	Period 6 days	I	Period J da	
Average daily (intravenous) geletin-grams	1	5		
Average dally nitrogen in diet-grams	5		7	4
Average daily calories in diet	\$20		1573	
Average daily total nitrogen intake-grams	16	5	7	4
Average daily nitrogen extretion—grams	18	B	6	1
A man on della mitrogen belence personal	+ 2	7	<b>+</b> r	

Data in a third patient who received all nutriment intravenously follow

Patient Nels No 356063, male, aged 58 years was suffering from carcinomatosis primary in the stomach.

	4 6071	4
Average daily (intravenous) gelatin—grams Average daily nitrogen (intravenous) casein	** *	11 1
object-grams	6 0	• •
otal nitrogen (intravenous)—grams	17 2	II s
ntravenous gincose grams	150	200
verage daily nitrogen excretion—grams	16 3	15 1
werage daily nitrogen balance—grams	+ 7	-4 1

A slight positive nitrogen balance was possible when gelatin and casein digest wer in jected, whereas when gelatin alone was injected there was pronounced negative balance. This may be explained by the inadequacy of gelatin alone as a nitrogenous nutriment whereas combined with casein digest all essential amino acids were afforded.

#### DISCUSSION

Parenteral nutrition by means of nitrogenous substances is in its early stages of development. Undoubtedly as progress in this field continues, newer types of solutions will be developed to afford increased efficiency of utilization and to include factors the escritality of which are not as yet appreciated.

The studies summarized herein indicate that certain gelatins may be employed for the parenteral administration of introgen and that nitrogen in such form is anabolically utilized. The principle demonstrated is that a nonantigenic protein may be administered parenterally and is at least partially utilized feasing and the summarized parenterally and is at least partially utilized if essential amino acids which it may not contain are otherwise a available

## SUMMARY

Experimental studies in dogs indicate that a certain type of gelatin administered mira venously is at least partially utilized for regeneration of plasma proteins.

Clinical experience indicates that intravenous gelatin constitutes one method by which nitrogenous substances for nutritional pur poses may be administered.

# INDICATIONS FOR ROENTGEN THERAPY OF BLADDER CARCINOMAS

# Recognition of Suitable Cases

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ADIATION therapy of carcinoma of the bladder comprises several procedures external roentgen therapy contact roentgen therapy through the suprapuble wound interstitual irradiation by means of removable radium needles or implantation of radon seeds into the tumor. The following discussion deals exclusively with external roentgen therapy of the bladder in an attempt to gain a working basis for indications of this type of treatment in the management of bladder carcinoma in contrast to other radiological and surgical procedures

Roentgen therapy of cancer in general has two distinct arms palliation or permanent cure. Palliative and radical curative roentgen therapy differ fundamentally in indications and technique in spite of the quite widespread missonception that an incomplete course of tradiation might still afford some palliation even if it does not completely sterilize the can cer Usually in such instances the added in jury of incomplete irradiation will rather

aggravate the condition Palliative roentgen therapy to be sure has its well defined place in the management of certain incurable cancerous manifestations but its scope is much narrower than is gener ally assumed and patients have to be selected as carefully as for the radical procedure. In the treatment of those cancers of the bladder which are considered incurable by surgical or radical radiological procedures because of the extension of the disease or the general condition radiation therapy with the purpose of palliation only has no place It is useless and in many instances harmful. The amount of irradiation necessary to produce sufficient tu mor response to cause even an appreciable retardation of growth will, if the tumor re mains uncontrolled cause so much discomfort

Frem the Tumor Institute of the Swedish Hospital, Scattle.

by increased frequency and pain with corresponding deterioration of the general condition that the term "palliative" becomes meaning less. Very occasionally the use of irradiation as a hemostyptic agent may be considered Usually, however the hemostyptic effect if accomplished at all will be of only very short duration unless a marked actual tumor response is induced. In short, the procedure necessary to produce even a temporary tumor regression for the types of cancer encountered in the bladder is of a magnitude out of propor tion to its possible results even in cases in which it does not actually aggravate the con dition The damnable practice of giving a few light treatments for psychological rea sons in hopeless cases will only discredit the procedure in the minds of those surgeons and urologists who do not yet appreciate the value of radical roentgen therapy for carefully se lected suitable cases.

Radical roentgen therapy, in the meaning of this term as we shall presently define it is young It dates from 1922 when Regaud Contard and Hautant demonstrated 6 pa tients with inoperable cancer of the larynx treated and cured by x ray therapy For the first time the fact was established that for cer tain types of tumors radiation therapy is superior to surgery that surgery and radiation therapy do not compete with each other that each procedure has its own indications. The fundamental principle of radical radiation therapy which Coutard has taught us is the careful adaptation of the treatment to the requirements of the individual patient (type of tumor extension general condition, response to treatment) under the guidance of detailed daily examination. In this way-and in this way only-is it possible to push the dose to the necessary tumor sterilizing level without causing intolerable permanent damage to the sur

rounding structures. During the two decades that followed this fundamental and epochal demonstration we have learned to apply this type of treatment to certain tumors such as those of the larynx, pharynx, and cervixwith a degree of certainty that their treatment has passed the stage of the clinical experiment and is now considered as a well established clinical procedure not a last resort in hopeless cases. Accumulated experience has taught us to recognize certain factors as decisive for the recognition of suitable cases for the determi nation of the prognosis and for the actual conduct of therapy the histological type of the tumor its exact location and extension and the general condition of the patient. We have learned for example that the all inclu sive diagnosis of carcinoma of the larvnx is meaningless unless it is qualified by a detailed description of the place of origin (true cord false cord epiglottis etc.) and extension (mobility or fixation invasion of muscle or carti lage etc.)

In the treatment of cancers of the bladder this stage has not yet been reached. In certain instances bladder cancers have responded to roentgen therapy satisfactorily enough to demonstrate the essential radiovulnerability of these tumors and to encourage further at tempts. As a whole however it seems from a review of the literature that the treatment has been given in a more or less haphazard and unsystematic fashnoin in regard to the selection of cases and the technique used. In general one gains the impression that more often than not roentgen therapy in bladder carcinoma is resorted to only as a last attempt after the unlogist has failed.

The main reason for this unsatisfactory state of affairs is probably an insufficient cooperation between the urologist and the radii ation therapist. As has been pointed out before the fundamental requirement for rad leal rocatigen therapy is a careful adaptation of the procedure to the requirement of the individual case. We have seen radiologists treating bladder carcinomas without ever having looked into these bladders or without having studied the microscopic section of the bloopy. It is impossible to treat adequately a carcinoma of the larging or cervity without de

tailed appraisal of the individual situation by the radiotherapist himself the same is naturally true for carcinoma of the bladder The personal examination cannot be fully replaced even by the best description Naturally the radiation therapist cannot be a specialist in all fields but he must have enough working knowledge in the borderline specialties to enable him to interpret intelligently the findings in close collaboration with the respective me cialist. In the conduct of treatment for our cinoma of the bladder in comparison to larynx and cervix, we are somewhat handicapped by the impossibility of regular inspection of the local response since of course frequent cystescopies during and immediately following treatment even in the best hands would agree vate the treatment reaction and induce serious complications. But a detailed preliminary examination by the radiation therapist in col laboration with the urologist is essential.

From the experience with other tumors it can be assumed that probably only certain types of bladder carchomas, if any would be suitable for this kind of treatment while others may be more benefited by other procedures such as surgical excision fulguration or interstitial radium application. Real progress can be expected only by correlating the successor failure with the details of the individual case treated—with respect to type location extension of tumor general condition of the patient, complicating features such as infection and obstruction as well as considering the details

of the procedure used

With these ideas in mind we analyzed in
1941 the 44 cases of carcinoma of the bladder
treated in this Institute between 1934 and
1939 with external supervoltage therapy (1)
At that time we reached certain tentative
conclusions regarding contrainfications and
indications which since then have been used
as a working besis to guide us in the selection
of suitable cases. Again m 1942 we reviewed
our maternal of 52 patients treated between
1934 and 1940 (2) A summary of the entire
group of patients treated by this procedure
during the 10 year period between 1934 and
1943 18 given in Table I.

The experience of others (3 4 5 6) as well as our own in certain carcinomas of the blad-

der demonstrates the possibility of cure with external roentgen therapy. The details of the apparently cured cases including photomicrographs were presented in our previous reports. Our increased experience since the insir report has substantiated our conclusions regarding the contraindications for this procedure. Regarding indications we have to modify our conclusions somewhat in so far as we have seen some patients apparently cured who have shown types of tumors originally considered unsuitable for this type of therapy.

In analyzing the failures as well as the successes we are led to the conclusion that 5 main factors seem to be declaive for the indication for roentgen therapy (1) the biological type of tumor (2) extension of the disease (3) general condition of the patient (4) previous therapy of any kind (5) technique of treatment

## THE BIOLOGICAL TYPE OF TUMOR

As in malignant tumors of other organs the biological type of tumor is probably the most important single factor. The possibility of sterilizing certain malignant tumors by ioniz ing radiation is due to one of nature a whims which has endowed certain normal and abnormal cells with a sensitivity to this type of irradiation By trial and error on the basis of empincal experience we have learned to recog mre certain tumors as radiovulnerable and others as resistant to ionizing irraduation. In caronoma of the bladder our experience is still too young to make final conclusions. It seems however that the tumors most suitable for irradiation are the papillary carcinomas without invasion of the bladder wall. In our former reports we have stated that all of our patients treated successfully belong to this group At that time we emphasized that we were not in full agreement with other reports in the literature in which successful treatment of invasive bladder tumors by x ray therapy was reported. During the last years we have had occasion to treat 2 patients who belong in this group and whom we first very reluctantly accepted for treatment because of the invasive character of the tumor So far they have shown so complete and persistent a disappear ance of the tumor that in all likelihood they will remain cured In these cases the diagnosis

TABLE 1 —SUMMARY OF 69 CASES DURING 10 YEAR PERIOD 1934-1943

TOTAL PROPERTY.			Late divine and and	Time.
Year	No treated	A WEB to date		Lest
534	٠	3	3	
935		7	4	3
014	ı			
9.57	t			_
238	4		8	
039	٥		\$	
940	•		1	
94	0	1		
04	5		4	
943	1			
Total	4	1	<b>\$</b> 5	

of the invasive character was made on the cystoscopic as well as the microscopic evi dence We have however no way to tell whether the invasion in these cases extended into the muscular structures of the bladder or was limited to the mucous membrane itself Experience with cancers of other organs has shown that the curability decreases with progressive invasion of the adjoining muscular structures. We believe therefore that the most suitable types for radiation therapy are the papillary carcinomas without marked in vasion of the bladder wall. It must be kept in mind that this invasion may not be demon strable at the first cystoscopy or by prelimi nary biopsy examinations because only the papiliary portion of the tumor intruding into the bladder may be resected for biopsy. An experienced urologist however can recognize the bladder wall involvement to a certain de gree The picture may be masked by a second ary inflammatory reaction and in these instances the infiltration may be less real than apparent. On the other hand certain growths can be definitely recognized as infiltrating growths by cystoscopic examination palpa tors findings and histological examination We do not believe that a cancer of the bladder once it has deeply infiltrated the muscular structures or has extended beyond the bladder itself is still a suitable object for radiation therapy Some infiltrative growths as long as the infiltration remains fairly superficial may still occasionally be sterilized

On the other hand we have seen recurrences in cases of very low grade papillary carcinomas (which by some pathologists would be termed papilloma or malignant papilloma) following a course of supposedly adequate therapy. On the basis of this yet very limited experience it would seem that the most suit able carcinomas are the recurrent papillary carcinomas of a moderate degree of differentiation, those which the urologist considers as beyond his control by receated fulguration.

## EXTENSION OF THE DISEASE

From the foregoing discussion it becomes evident that regardless of the type of tumor, the extension of the disease will have a marked effect on the outcome. While naturally cases with demonstrable distant metastases are beyond treatment one might at times be tempt ed to treat those which locally have extended beyond the bladder proper. If we feel that the invasion of the bladder muscle itself already demarcates the limits of curability by roent gen therapy obviously cases with involvement of the perivesicular structures are beyond therapeutic approach In former years in practically all patients seen the disease had extended beyond the surgeon a reach. It was for this reason that they were referred for roentgen therapy During recent years the situation has changed and due to our increased experience with indications and contraindica tions and in closer co-operation with the prologists we now receive patients for treat ment who technically could still be treated by surgical procedures but for whom the urologists now too feel that roentgen therapy may offer a better chance because of the recurrent character of this type of lesson.

## GENERAL CONDITION OF THE PATIENT

As in roentgen therapy for other cancer we have seen that the appraisal of the general condition of the patient quite generally is underestimated in the decision as to indications for roentgen therapy. Consequently it is believed that if a patient is unsuitable for surgery because of his general condition roentgen therapy might still be attempted Very rarely should the general condition be a decisive factor for determination of surgical

versus radiological indications. With the ex cention of occasional instances of specific matraindications, such as cardiovascular disease which prohibits surgery patients who are refused surgery on account of their general condition will not support a treatment of such magnitude as radiation therapy In many a physician s mind radiation therapy of cancer still seems to be a kind of glorified nitraviolet or diathermy. It must be realized that radical radiation therapy with the purpose of cure represents a procedure of such formidable magnitude that it will be supported only by patients in good general condition. It is mainly the lack of appreciation of the meaning of the term radical roentgen therapy which leads physicians and patients alike to believe that a few light treatments might accomplish mine ulous results. Actually the treatment of a cancer of the bladder requires daily treatment for about 6 to 8 weeks. Following the therapy a bladder reaction will develop leading to frequency of urination and pain. The intensity of this reaction varies within wide limits. It depends partly on the location of the tumor the condition of the bladder mucosa in general and on the individual sensitivity. If the tumor is located in the dome the reaction usually will be less marked than if it is located in the trigonal region encroaching on the urethral orifice A tumor located in the lower most portion of the bladder necessitating in radiation of the prostatic urethra will lead to a very marked reaction with considerable distress. The reaction in men usually is more intense than in women. Marked infection of the bladder mucosa outside of the tumorous portion will also markedly increase the intersity of the bladder reaction. If this is a soclated with a urethral obstruction by either tumor or prostate interfering with bladder drainage the reaction may be so intense that the actual deterioration of the patient's condition becomes dangerous. Frequency and path under these conditions interferes so markedly with the patient's general condition that it makes the continuance of adequate radiation therapy impossible We now refuse patients for treatment in whom either a severe infec tion is present or adequate drainage cannot be established. In cases in which it is possible

to remove either the enlarged prostrate or the occluding tumor mass to re-establish drainage we ask for this procedure prior to rentgen therapy. If the drainage is either adequate from the beginning or is re-established, one might cautiously begin radiation therapy for the accompanying infection. The treatment itself in some cases may improve the mection at which time the more intense therapy for the carcinoma can be established. However, if we do not succeed in combating the infection before the more intense roentigen therapy begins we are very soon handicapped in the adequate conduct of treatment, which will not be successful.

From this discussion it becomes evident that patients in a poor general condition are not suitable objects for this kind of therapy. We have found however, that age in itself in an otherwise well preserved body without accompanying infection and not too far ad vanced disease does not represent an absolute contraindication to the treatment.

## PREVIOUS THERAPY

Suprapuble operation preceding roentgen therapy considerably lowers the possibility of adequate irradiation. We have observed the breakdown of a suprapubic scar shortly after uradiation in 2 patients. In both cases the contributing factor to the breakdown could be found in an increased intravesicular pressure from interference with adequate drainage We believe however that in spite of these additional difficulties the previous suprapubic operation itself is a severe handicap to ade quate irradiation If roentgen therapy is con sidered we feel therefore that either a supra pubic cystotomy should be avoided or should be done high enough to keep the scar outside the field of irradiation. This latter procedure may sometimes be used when an attempt at suprapuble resection may be preferable yet a recurrence of a type of carcinoma suitable for mentgen therapy later on may be considered

Occasionally patients have been referred after unauccessful treatment by means of interstital irradiation. As in all other kinds of taronoma these patients are not suitable for further uradiation. Cancer therapy by arradiation in an all or none procedure. If the first

attempt fails success can practically never be expected by further irradiation. The tissues do not tolerate the dose necessary for steriliza tion of the tumor after they have received previous radiation therapy The tumor itself has become more radioresistant and due to fibrosis is less amenable to further irradiation If interstitial irradiation has been given by means of permanently implanted seeds the presence of the metal with a secondary irradi ation in its immediate neighborhood will add to the necrotic effect of the irradiation and jeopardize the treatment even more than previous radiation therapy by other proced ures It is obvious therefore that these pa tients should be refused for roentgen therapy

The situation is somewhat different with regard to previous fulguration. Indeed the most favorable cases for roentgen therapy of the bladder are apparently those that show recurrent papillary carcinoma. In these in stances fulguration has usually been attempt ed and the patient is referred at a time when the recurrence becomes either too widespread or develops too rapidly for further fulguration These cases are still suitable for roentgen therapy provided the growth has not invaded too far into the bladder wall. If roentgen ther any is considered it should not be done im mediately following a recent fulguration in a case in which fulguration has been done once or twice roentgen therapy is considered for a new recurrence the surgeon should refer this patient for radiation therapy without any further attempts to fulgurate. The necrosis following fulguration will only intensify the bladder reaction and complicate the proper conduct of therapy

## TECHNIQUE OF TREATMENT

We do not intend to discuss the technical details of the therapy but we wish to emphasize a few points which we believe have been the cause of failures in a number of our cases. The main technical errors which may lead to failure in cases primarily considered as curable leasons may be due to misjudgment of the field size in relation to the tumor or to insufficient or too rapid treatment. Led by cystoscopic examination which showed the tumor area limited to one side of the bladder we have

tried to increase the dose to this area with corresponding diminution of the dose on the contralateral portion. We have abandoned this procedure because we have observed definite progression of the tumor on the under treated side. It is probably not possible to judge exactly the limitation of the field in the bladder itself and it is necessary to include the entire bladder in the field during the whole course of treatment. Furthermore it seems necessary to treat the entire bladder in the recurrent papillary growth (the most suitable type for roentgen therapy) in order to prevent recurrences in other parts of the mucosa.

In one case we have observed recurrence of a papillary carcinoma in the lowermost por tion of the trigone close to the bladder neck while the remaining bladder remained clear throughout the observation time. Since we had no other reasons to explain this localized recurrence we feel that in all likelihood it was due to an underdose in this most peripheral area of the field.

In 2 cases of our series, a severe pelvic fibrosis developed undoubtedly due to overtreat ment. In r case the bladder capacity became so reduced due to the bladder fibrosis that a transplantation of the ureters was found necessary. In this case the ureters were found dilated to about 4 times normal size and the kidney pelves dilated and infected. This patient died subsequent to transplantation. In another case the final outcome was not fatal, but such a marked rectal fibrosis developed that a regular rectal dilatation became necessary to avoid complete rectal obstruction.

These patients were treated during the early years of the use of supervoltage roentgen ther apy when the danger to the deeper structures was not sufficiently appreciated. We have since then learned to avoid these severe reactions and no severe by-effects due to treat ment have been observed so far in the cases observed in the last 6 years. It should be particularly pointed out that necrotic ulcers in the bladder which are at times found after treatment of uterine carcinoma have never been observed in roentgen therapy of bladder carcinoma. This indicates that they are most likely due to faulty technique in the radium application in cancers of the cervix rather than

to the external irradiation In cases of cardinoma of the bladder which are controlled, cystoscopy usually does not show my remained to the disease or any appreciable trace of the preceding irradiation. In most instances it is impossible for the unologist to recognize it is impossible for the unologist to recognize the location of the former lesson unless there is some area of atrophy or superficial scarring. In most cases the bladder mucosa appears normal unless the tumor was very extensive.

Rectal reactions of any degree of intensity likewise are not observed when the technique has been carefully controlled. Most of our patients are treated through 3 fields one control anterior port and two oblique lateral ports centered toward the bladder. In this way the rectum receives its main irradiation through the anterior port only while most of the rectum is spared by the posterior fields. Only very occasionally we have observed evans transitiory distribute.

We believe that the use of supervoltage roentgen therapy in the treatment of bladder carcinoma has a decisive advantage over the use of the lower voltages. It is possible to administer a tumor sterilizing dose through 3 comparatively small fields. With the lower voltage this tumor dose could be obtained only by a large number of fields because the skin of one single field would not tolerate the amount which it is possible to administer with super voltage radiation. When the number of fields is increased each single field also must be larger because the aiming toward the bladder from any but the 3 fields mentioned is difficult and in order to include the entire bladder the field has to be fairly large It thus necessitates a greater volume dose throughout the body quite frequently accompanied by more intense ceneral reaction.

## SUMMARY AND CONCLUSIONS

Of 68 patients with advanced carcinoms of the bladder treated between 1934, and 1959 with 800 kilovolt roentgen firmdiation 10 are so far clinically well and cystoscopically without evidence of disease. Seven of these are well and have remained well for more than 4, years. The analysis of the successes and fail ures had led to certain tentative conductors with regard to indications and contraindice tions of this procedure. We wish to emphasize that we do not consider these conclusions final but only a working basis for further investi

Contraindications External roentgen ther any of the type here discussed for carcinoma of the bladder is a formidable procedure Only patients in good general condition will support such a major procedure. Adequate bladder dramage and capacity and absence of marked infection are prerequisites for a fair trial by this method Previous suprapubic operation particularly in the presence of any obstruction or infection constitutes an additional hazard to intense irradiation

It is self evident therefore that this method is not a procedure suitable for palliative pur power Cancers moperable because of extra vencular extension have not been benefited

Inducations While increased experience during the last years has shown that our adherence to the contramdications as outlined is justified we have somewhat modified our position with regard to the indications. The most suitable cases for radical roentgen ther apy are the extensive papillary carcinomas in which infiltration cannot be demonstrated If papillary carcinomas recur after repeated ful guration or if the surgeon feels that a certain type of carcinoma will probably recur after fulguration roentgen therapy is indicated without further delay if it is considered at all. We mean that one should make up his mind in a particular case whether it should be treated by roentgen therapy or by some other proced ure If roentgen therapy is chosen it should not be requested as a last resort when the con ditions for success have become considerably lessened by infiltration poor general condi tion or associated infection

The likelihood of cure by roentgen therapy is less marked in infiltrative growths. While there are some reports in the literature and in our own series substantiating the belief that certain infiltrative carcinomas might still be cured, we believe that the likelihood of con trol becomes practically nil when the bladder muscle is invaded. We cannot yet determine with certainty whether those patients who have benefited showed an infiltration of the

bladder mucosa only without true infiltration of the bladder wall but from our experience with other carcinomas, it is obvious that with progressing infiltration control by rocutgen therapy is correspondingly decreased Carci nomas that have developed beyond the blad der wall and have become palpable by rectal examination are beyond cure. It must be considered that occasionally an infiltration might be apparent which may be due to ac companying inflammatory infiltration rather than true caremomatous extension. It must also be kept in mind that the histological exammation of the removed specimen may be misleading. The biopsy obtained from the periphery of the growth may not demonstrate deeper infiltrative portions of the tumor A loop resection biopsy adequately done may give more adequate information than a biopsy taken only from the surface of the growth

We feel therefore that a small carcinoma of a primarily infiltrating type is better han died by surgical excision if this is feasible. If the lesion is so located that a complete bladder resection is the only surgical procedure possible interstitual irradiation preferably in the form of implantation of removable radium needles is probably superior to roentgen ther apy provided the actual size of the tumor is not beyond about 3 5 centimeters in diameter

With increasing experience we hope better to differentiate these tumors-those which are sultable for roentgen therapy from those which receive more benefit from other proced ures Progress however can be expected only by a careful selection of cases and impartial analysis of successes and failures. This can be accomplished only by close co-operation between urologist and radiotherapist

## REFERENCES

- BUIGHER, FRAME, and CARTREL, SERROW T. Radiation Therapy; a Supplement to the Staff Journal of the Swedish Hospital, May 1941 No. 2 p. 77
- sweemen Hospital, alsy 1941 Fo. 2 p. 77

  liden J Urol, Ball, 1942 45 056

  COTIER, MAX, BORGHER, PLANE, and CAMPERI, SINDON
  T Cancer Its Dispressis and Treatment, P 325.
  Philadelphia W B Saunders & Co., 1948
  FERGURON R. S. Am. J. Roentg 1949 50 73

  HERMEN, C. C., and SAURE, H. R. J. Urol., Ball., 1943
- 50 Sto. 6. Prantice, G. E., and Vartive, J. M. J. Am. M. Ast., 1935 1941 600.

## REFLEX SYMPATHETIC DYSTROPHY

## JAMES A. EVANS M.D. Boston Massachusetts

EFLEX sympathetic dystrophy is a most disabling often extremely pain ful malady following minor sprains ordinary fractures or in military or civil life trauma to blood vessels or nerves. The syndrome is characterized only at times by the excruciating burning pain that has given it the term causalgia, hence a misnomer Pain may be moderate mild or absent. The true diagnostic features are those disor ders initiated by perversions of reflex sympa thetic stimulation namely increased rubor or pallor sweating edema, atrophy of skin and spotty or even cystic atrophy of bone

Mitchell Morehouse and Keen wrote the first brilliant description of this distressful phenomenon based on cases of gunshot wounds to perves and blood vessels in the Civil War Sudeck described cases of painful joint in volvement giving rise to the term Sudeck s syndrome Lenche pointed out most vividly the role of the sympathetic system in the per nicious reflex, and Homans, in his presidential address to the Massachusetts Medical Society in 1040 brilliantly described the picture and cure of several cases of minor causalgla Livingston in his scholarly monograph en titled Pain Mechanisms I would wish to give credit for the clearest theoretical elucida. tion of the reflex itself. In the diagram and ideas expressed in this article. I have borrowed heavily from his theory to explain the vicious circle producing the syndrome of reflex sym pathetic dystrophy

## MECHANISM OF REPLEX SYMPATHETIC DYSTROPHY

Figure I illustrates diagrammatically the nervous pathways giving rise to the syn drome of reflex sympathetic dystrophy The fundamental concept of the internuncial pool (Fig 2) advanced by Lorente de Nó and adopted by Livingston can be explained simply as follows. A prolonged bombardment of pain impulses sets up a victous circle of From the Department of Internal Medicine, The Lakey Chile,

reflexes spreading through a pool of many neuron connections upward, downward, and even across the spinal cord, and perhaps reaching as high as the thalamus itself. Be cause of the summation principle of nervous impulses, there is kept alive within such a pool a constant circling of activity across the synapses involved Some of these synapses include the sympathetic motor neuron cells in the lat eral horn controlling vasomotor tone and the sweat glands Spasm in the arteriolar and venule end of the capillary loops raises filtration pressure and edema and swelling result. Cyanosis and anoxemia increase capillary per meability and filtration further augmenting edema. Other synapses involved may be the anterior motor horn cells, giving rise to skeletal muscle cramps and spasms. Out of the pool also arise augmented stimult to pain traveling up the thalamic tract Depending on the wide spread of the pool we detect the phenomena of pain and sympathetic disturbances observed a long distance from the injured area in the limb and occasionally even spread to the con tralateral limb The afferent pathway is represented as the sensory nerve fibers traveling in the posterior root since according to Livingston after careful review of the evidence, pain bearing fibers do not exist in the sympa thetic somatic system. Therefore, the aboltion of pain by severance of the sympathetic pathway is not due directly to any blocking of afferent pain fibers but to an interruption of the efferent sympathetic pathways leading from the internuncial pool. It must be noted, however that pain relief is not always complete and further measures must be taken, as noted in the paragraph on treatment

## ETIOLOGY

In the past 3 years I have gathered mainly from the orthopedic service the neurosurgical service and a few from the medical and surgical services of the Lahey Clinic, 33 cases of reflex sympathetic dystrophy The exiting trauma or diseases are as follows sprain, o

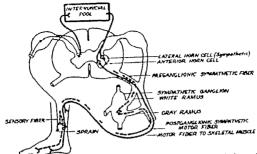


Fig 1 Reflex are of sympathetic dystrophy embodying Lorente de No's theory of the "internancial pool" (Fig. s)

fracture, 5 thrombophlebitis, 4 poor foot statics 3, bruise 2 amputation, 2 scalenus syndrome (?) 2 laceration of hand I anter or poliomychtis (?), 1, plantar wart 1 gonor rheal arthritis 1 thalamic syndrome (cere brovascular accident) I In addition there were the complications of fungus infection in 3 and operative interference in 3 Mindful of conceiving of these cases as reflex sympathetic dystrophy and not necessarily causalgia I have included cases which showed undoubted sympathetic vascular or sweating phenomena and only incidentally pain. This concept has led me to include 4 cases of thrombophic bitis Injury to blood vessels in the form of arterial mjury has been reported before as a cause for causalga (Homans Weir Mitchell, and assocastes) thrombophiebitis is less often recog nized as a possible source of causaldia. In 3 of the 4 cases of thrombophlebitis muscle cramps have been an outstanding feature of the pain One of these 3 patients had no constant pain but only cramps. One patient with reflex sym pathetic dystrophy with a history of 'torn ligaments in the wrist 10 months before and

effer Lie No

Fig. s. Internencial pool—closed self-re-exciting chain.

operative interference 4 months later had no pain but the sympathetic phenomena of rubor swelling and hyperhydrosis were present to a marked degree

Injuries in the form of sprain fracture bruse incerations and amputations together accounted for 59 per cent of the cases. Three of the patients suffered from poor foot statics the respective diagnoses being pronated feet relaxed feet with metarsalgia and pes planus.

Two cases of scalenus syndrome (unproved by operation) are included because the scale nus pressure had produced Raynaud's syn

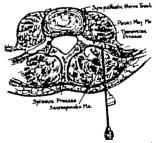


Fig. 3. Technique of paralumbar sympathetic procains block. (Fom Nicholson, Anesth. and Analy., May June 1948.)

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drome together with constant pain, relieved by cervical sympathetic procaine block.

In one case a plantar wart gave rise to excruciating pain in the foot associated with rubor and swelling of 9 months duration

A patient who had had gonorrheal arthritis of the foot 8 years before retained a swollen sore big toe for 8 years. Roentgenogram of the toe demonstrated an aseptic necrosis and physical examination revealed rubor swelling and hyperhydrosis associated with fungoid ulcers. Severance of the lumbar sympathetics abolished pain and led to healing of the ulcers after abolition of the excessive sweaturs.

One patient with thalamic syndrome who had hemiparesia following a cerebrovascular accident experienced temporary relief of cau salgic pain in her right arm after cervical sympathetic block with proceine. This surpraising result might arouse much speculation on the mechanism of so called thalamic pain. Opportunities to repeat this observation are needed.

A single case is reported here of terrific cau salgic pain for 25 years that may have fol lowed infantile paralysis at the age of five

Local operative interference may only exacerbate the reflex sympathetic dystrophy already well established, as occurred in a cases. In such cases sympathectomy is advisable before the necessary local surgical procedure is attempted. Fungus complications in the fertile soil created by hyperhydrosis seemed to increase the severity of the symptoms in a cases.

PAIN

Pain is usually the most prominent feature in reflex sympathetic dystrophy. It may be one of the most excruciating pains human flesh is heir to a deep burning agony through out an entire foot, hand or limb that makes a patient wince as one approaches him with the examining hand a pain that sometimes makes him contemplate suicide points are often multiple and pressure on one often spreads a diffuse pain of a burning pecuhar nature up and down the limb More often m less severe cases the pain response stays definitely localized to the trigger point. In our 32 cases, trigger points, single or multiple were found in 10. Pain was excruciating and of a burning causalgic nature in 5 rated

severe in 12 moderate in 11 mildin 2 and some existed in 2 cases. These last two patients showed other signs of reflex sympathetic dytrophy

## OTHER SYMPTOMS AND SIGNS

Rubor was present in 15 and pallor in a cases. The rubor may be so constant and the foot or hand be so hot that the picture of erythromelalgia is produced. Livingston has suggested that rubor is often present in early cases pallor in the more chronic cases. This has not been my impression in this series in 6 cases rubor was present and of 1 year's days tion or more and in 1 case for as long as 18 years Swelling or sweating or both was present in over half of the cases. Atrophy of the akin was noted in 4 and of muscle in 7 patients. The typical bone atrophy of sympathetic ongin is mottled in advanced cases even cystic. presumably owing to nutrient artery spans. Such bone atrophy was described in the rosat genograms of 6 patients in this series. A dil fuse osteoporosis resembling that of distre was noted in 5 cases. Trigger points were noted in 19 cases.

#### DIAGNOSIS

Either cervical or paralumbar sympathet proculne block comprises a diagnostic their peutic teat. The relief of pain may be almost miraculous but need not be so dramatic as a establish the diagnosis provided relief of other phenomena is also noted, such as rile of awasting increased warmth and comfort is a cold member associated with rise of six temperature (temperature index test) as disappearance of trigger points. Nizeteno our 3s patients had blocks performed will varying amounts of rehel in all but one

## TREATMENT

The ideal point of attack would be the inter nuncial pool itself. So far no direct effective means is at hand to stop the vicious circk within this pool of neuron synapser.

Two other points of attack exist the trigger points and the sympathetic pathway Repeated injections of the trigger points usually are necessary. If the sympathetic pathway is blocked by procure one is occasionally grati-



Fig. 4. Case 2 Mottled bone atrophy of reflex sympa thetic dystrophy (Sudeck's syndrone) Fig. 5 Case 3. Marked mottled type of bone atrophy Fig. 6 Case 5. Gonorrheal arthritis 8 years before ad

mission no evidence of gonorrheal activity at present Aseptic necrons of both phalanges of right great toe diffuse osteoprosis of disuse. Condition was cured by splanehnicectomy

fed by the astounding relief obtained with only one injection. More often there are re lapses within a few days or weeks and repeated injections are necessary at longer and longer intervals. It would seem more logical to give a senes of three injections one every second day for more permanent rupture of the permiculus refer a method so successfully applied to thromborhlebitis (Fig. 1)

At the clinic we have felt it best to resort to sympathectomy in the majority of our treated cases after the demonstration of the efficacy of one block in order to obtain the maximum of relef and the greatest assurance of perman ency of relief.

Posterior root rhizotomy cordotomy or for high cervical segment interruption of the thalamic pathways in the medulla and even resection of the sensory cortex may be nec essary in exceptional cases

Vineteen patients received sympathetic produced block with varying amounts of relect of pain and sympathetic phenomena in all but one. Nine patients were treated by block alone. Of these q 7 had 50 to 100 per cent

rehef of pain for 3 weeks to permanent rehef Two of the 9 received only temporary rehef for the duration of the procaine effect. Only 1 patient was treated by injection of trigger points as well as by sympathetic procaine block, with relief of pain for only 3 weeks. A sympathectomy is to be done on this patient Thirteen patients have had sympathectomy with pain rehef ranging from 75 to 100 per cent in 9 (69 per cent). Failure to 25 per cent rehef resulted in 4 of the 13 cases.

#### ILLUSTRATIVE CASE REPORTS

CASE 1 A woman aged 30 years came to the clinic November 20 1943 because of extreme cau salgue type of pain in the right leg for 25 years following an attack of what may have been antered pollomy-clinis at the age of 5 years. There was marked rubor moderate swelling and marked sweating and several trigger points were present. The pain was so extreme that she hard developed a conditioned reflex with the hands breaking out into sweat if one made a motion toward her foot as though to touch it. She took a half hour in the morning to put her shoes on because her right foot was 50 tender.

Paravertebral sympathetic block afforded marked temporary relief. Sympathectomy was performed.



Fig. 7 Case 6 Thrombophicistis of 8 years' duration. Venogram aboving no filing of deep venous circulation. Tig. 8. Case 7 Calina of old "march fracture

with 90 per cent relief of pain and 100 per cent relief of pain and excessive sweating when the patient was seen 1 year and 10 months later. There was still slight tenderness over the trigger points behind the external malleolus below the lateral aspect of the right knee. The patient was most grateful.

CASE 2 Å woman came to the cline February 16, 1044 because of mild pain, rubor swelling and alight muscle atrophy which had been present ever since she sprained ber ankle 9 months before admission. The roentgenogram showed mottled bone atrophy (Fig. 4) Fars vertebral sympathetic block afforded temporary relief. Sympathectomy was done with op per cent relief of pain in 2 months. At this same time a roentgenogram showed less bone atrophy.

phy CASE 3 A man had sustained a fracture of the second metatarsal followed by operative removal of exotosis 6 months before admission to the clinic, October 8, 1944 For the past 6 months there had been severe pann in the foot. Trigger points, rubor swelling and bone atrophy were present (Fig. 5) Paravertebral sympathetic block afforded relief with disappearance of trigger points. Sympathec tomy was done and after 3 weeks there was relief of the causalgic pain. However pain was still persistent in the foot from the esteomyelitis of the second metatarsal. A colored photograph 3 weeks after operation showed defanitely less rubots and swelling

CASE 4. A man came to the clinic August 14, 1014, because of moderate pain in the right foot of 8 months duration. There was definite swelling and a blotchy type of bone atrophy. There was no bitory of trauma but marked per planus was preselted to the month after one paraverterbal block, not precent relief of pain was obtained. The patient also had proper shoe fitted.

had proper shoes fitted.

CARE 5 The man came to the clinic June 13 1944.

He had suffered from gonorrheal arthrits 8 years before admission. There had never been complete subsidence of pain in his right big toe and foot. Hyperhydrosis had been present, complicated by fungrinfection, with inderation. Rubor swelling, say marked swesting were apparent. A roungergomain showed an aseptic necrosis in the toe (Fig. 6) The patient sho had essential hypertension. For this reason a splanchinectiony rather than sympathic tomy was done. There was too per cent related the pain in the right foot and toe. There months little in foot was day and the ulcent had been dead to the complete the particle of the pain in the right foot and toe. There months little foot was day and the ulcent had been de Ached-or roentgenogram of the toe showed the same seepton necrosis present.

CAR 6. A woman came to the clinic Aogust 7
044. She had suffered postpartum thrombophebe
it 8 years before admission. For the last 6 years
there had been moderate pam, which had goves
much more severe during the last 2 years. A triger
point was present over the popilized vessels. A vess-

gram (Fig 7 s and b) showed fallure of deep venous filling in the calf and thigh. A paravertebral sympa thetic block afforded 100 per cent relief for a weeks following which there was a relapse. It is planned to inject the trigger point and repeat the paravertebral block.

CARE 7 A college girl aged 21 years came to the clinic September 7 1944. She had suffered moderate pain in the right lower leg following a fall skating 9 months before admission. Marked swelling and rubor developed. For the past 2 months purpunc spots had appeared over the right lower leg Sweating had become pronounced. Soon after the fall she was confined to bed with what was called the flu At this time she had fever and red streaks on her leg-A venogram at the time of her hospital entry showed normal filling of the deep calf veins and the femoral vem in the thigh. There was normal capillary fragil ity in the affected leg. Coagulation time bleeding time and platelets were normal. A roentgenogram of the tibia revealed the callus of an old march frac ture" (Fig 8)

This patient was treated with a series of three paravertebral sympathetic procaine blocks in 1 week. At the end of the week the swelling had subsided and the trigger points had disappeared. She was seen a months later and pain was completely relieved

Case 8 A woman had sustained a laceration on the dorsum of the right hand a year before being seen at the clinic, September 7 1944. Two operations had been performed on the hand in the hope of relieving severe causalgic pain of a year's duration. Trigger points pallor sweating and muscle atrophy were present. Roentgenograms demonstrated diffuse bone Paravertebral block afforded no relief evertheless sympathectomy was done, with 50 per cent relief of pam 3 months later This patient needs much physical therapy which it is now possible to give because the limb is so much less tender to manipulation. Injections of trigger points are ad vised.

CASE 9 A man came to the clinic, June 28 1944 because of a plantar wart with excruciating pain through the foot for 9 months A trugger point was present over the wart. Rubor and swelling of the foot were noted. Paralumbar sympathetic block was recommended but refused

#### SUMMARY

Reflex sympathetic dystrophy is described as a syndrome produced often by minor trau ma or disease in a limb leading to the reflex production of the sympathetic phenomena of rubor or pallor heat or cold increased sweat ing edema and pain Since the factor of pain

may be absent, the term reflex sympathetic dystrophy is preferred to causalgia.

The rôle of Lorente de Nô's internuncial pool' in the production of the syndrome of reflex sympathetic dystrophy is presented

Traumatic injury accounted for only 50 per cent of the 32 cases reported.

The typical bone atrophy of reflex sympa thetic dystrophy is mottled or cystic (Su deck s syndrome)

Diagnosis depends largely on the demon stration of relief by sympathetic procaine Nineteen of the 32 patients received sympathetic block with procaine, with vary ing amounts of relief of pain and sympathetic phenomena in all but I patient.

Treatment may be directed to blocking the trigger points if they exist and to blocking the sympathetic pathway In o patients treated by sympathetic procaine block alone 7 had relief of pain varying from 3 weeks to permanent such pain relief estimated at 50 to 100 per cent. The other 2 received relief of pain only for the duration of the procume effect

Thirteen patients of the 32 here reported had sympathectomy performed with relief of pain ranging from 75 to 100 per cent in o or 60 per cent. Failure to 25 per cent relief of pain resulted in 4 of the 13 The 2 patients who had no pain but other sympathetic phe nomena have so far not submitted to either block or sympathectomy

#### REFERENCES

- HOMANS, J. N. England J. M. 1040, 222 870-874 LEMCHE, R., and POLICARD A. Physiologic puthogique, chirurgicale inflammations, effeta des trau matismes, réparation des plaies, greffes, malades des os, des articulations, des vaisseaux et des nerfa.
- Paris Messon et Cle 1930.
  3 Livixostov W.A. Pain Mechanisms A Physiological Interpretation of Causaigia and its Related States, Chap 14, New York The Macmillan Co.,
- 1 LORENTE DE NÓ R. J \europhysiol 1938, 1 207-
- 244. MITCHELL, S.W., MOREHOUSE, G.R., and KEEN W. W. Gunshot Wounds and Other Injuries of Nerves.
  Philadelphia J B Lippincott Co., 1864
  6. Sudck, P Arch kin Chir., 1900, 62 147-156

# A SINGLE STAGE OPERATIVE METHOD OF MANAGEMENT OF CHRONICALIY INFECTED UNUNITED FRACTURES

FRED G HICKS M.D F.A.C.S Quebec, Canada

OMPOUND fractures of the long bones are seen relatively frequently among war casualties particularly favored for this injury are both bones of the leg Unfortunately a rather high percentage of these cases become infected and later present the picture of chronic osteomyelitis or soft tissue infection and nonunion Review of statistics reveals that there has been an increase in the incidence of faulty union during this war seen in both simple and compound cases in spite of the use of the sulfonamides and penicillin. In a good number of cases treatment was delayed by transport difficulties others were wounded previous to routine use of the drugs.

In the far past, because of a long line of un happy experiences a markedly conservative restriction was placed upon surgical interference in cases with infection. Operation was mentioned only to be condemned. Recently since the advent of the chemotherapeutic agents which render the infecting organisms avirulent practice has been to administer preliminary supportive and specific therapy then at operation to excise the infected tissues as thoroughly as possible and secure drainage After subsidence of the infection a grafting operation is performed. This ac cepted procedure has been and still is for certain cases the one practiced here. How ever a number of protracted convalescent periods while cure of the infected area was awaited and one case of relighting of a latent infection some months after bone grafting caused a different procedure to be adopted with a certain type of patient.

Particular concern was shown over cases with marked loss of bone substance and ones with lengthy infection. In these instances in view of the extensive fibrosis of soft tussues. Trans See Anne. Military Hospital Ste. Anne de Bellevie.

with marked sclerosis and atrophy of the main fragment ends, it seemed that the preliminary operation for excision and drainage could not possibly remove all the factors of latent infection to prepare for grafting The length of convalence before rehabilitation could begin was not in the best interest of the nationt's mental outlook and general health equally important, it endangered the preser vation of function of the limb involved. The latter factor was of most serious import, as the prolonged immobilization would lead to in reparable contracture and fibrosis of the musculature and periarticular structures, resulting in partial or complete permanent disability of the limbs. A resultant united fracture in a limb with stiff or painful joints. would leave much to be desired. In patients with long standing osteomyelitis and moderate-sized bony defects, we believed that a departure from previous practice might be made before amputation was considered.

A group of patients was chosen for more radical procedure. Eleven cases with long bone involvement are illustrated below similar circumstances have been successfully treated in small bones. The patients were adults in the various armed services who received compound fractures in the line of duty with subsequent infection. All infec tions were in the quiescent state when treat Some patients revealed ment was begun frank osteomyelitis while others suffered from chronic infection of soft tissues, with or without dispersed small bone fragments Most of the patients showed a flail-type of nonunion plainly evident at physical examination. The technique of the single-stage procedure upon leg cases, consisting simply of a radical esteotomy and excision of infected soft tissue with internal fixation by plating will be given in outline to avoid repetition



Fly I Case I a. Preoperative views b I day post operative c. 8 weeks postoperative showing the usual

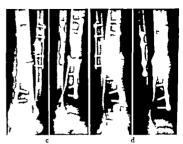
## PRELIMINARY PROCEDURE

- I Roentgenological investigation is made of the involved bones and adjacent joints. Sinuses are injected with radio-opaque ma tenal to determine recesses location of for eign material and such conditions
- 2 General condition is investigated thor oughly and an intensive therapeutic period is instituted with bed rest, this includes frequent whole blood and plasma transfusions high protein and vitamin intake (vitamin C is stressed)
- 3 Sulfathiazole is given orally to maintain a blood level of 5 milligrams per cent
- 4 In several instances dictated by in vestigation other medication such as thyroid extract, is instituted
- 5 Mild physiotherapy in form of gentle massage and movement is applied to the adjacent muscles and joints. No specific treatment of the local condition is adopted other than adequate splinting and the usual cleansing of sinus regions by shaving com presses, or dry dressings. For 12 hours previous to operation alcohol dressings are applied

The length of this treatment depends upon the degree of general depletion of each pa tient and the local skin condition in most instances the skin is severely crusted and granular from lengthy closed plaster therapy

## OPERATION

After skin preparation of the whole limb a generous longitudinal incision allowing wide



absorption and bone regeneration d i vear post operative.

exposure without tension on the skin is made The incision includes energling of sinus open ings and is placed 2 inches medial or lateral to the anterior tibial crest. The incision is deepened to expose the tibial periosteum. If possible without sacrifice of the closure all skin scar is excised at this time. However at times the excision of noninfected skin scar is delayed for a future plastic operation. Pains are taken not to traumatize the skin edges Sinus tracts and all devitalized tissues are excised completely loose bony fragments are removed but fragments which are deeply embedded, far from the fracture site and which have no apparent connecting tract are not disturbed The tibial periosteum over healthy bone is split and reflected about the whole circumference in most instances it is absent or replaced by scar over the infected region After the tibia has been separated from its bed the two main fragments are usually separated transversely by scalpel. At times the central block of eburnated bone and in fected granulation tissue are removed en masse by saw but in the majority of cases to allow resection of the bone at the proper levels, the former measure has to be taken The amount of the main fragments to be removed is more or less predetermined by x ray evidence of the extent and degree of bone sclerosis. The ends of the bones are sawed squarely across to expose freely bleeding marrow canals circumscribed by healthy cortex free of infected granulations. No heed is



Fig 2. Case 2 a, Preoperative views, b, months postoperative d, 7 months post operative.

paid at this time to length conservation the minimal requirement is that the segments to be approximated be viable. With such an in creased exposure the soft tissue bed of the fracture site, consisting of dense scar interspersed by small pockets of granulation tissue are thoroughly excised care being taken to preserve main arterial and nerve trunks. It is then necessary similarly to expose the fibu lar fracture site through separate or the same incision and accord it the treatment described. If the fibula has not been fractured, or more commonly if it has healed without infection an equal length of its shaft is excised by saw occasionally it is cut across obliquely to allow its fragments to override without removal of a portion If the tibia is markedly porotic, the fibula is transected low down so that the superior fragment crosses the tibial fracture to be incorporated in that bone for added strength The main tibial fragments are then accurately approximated in proper align ment and maintained so by an 8-screw vital llum plate The plate is applied to the antenor surface of the tibia opposite to the incision site e.g. if the incision is necessarily anteromedial the plate is fixated to the anterolateral tibual surface. (As in freshfracture plating certain principles are helpful (a) the plates used are long (b) the screws are

placed eccentrically for added nurchase. (c) the screws penetrate the opposite cortex, (d) if wire is used it is of the same metal). The wound is then thoroughly irrigated with normal saline and dusted with sulfathia zole powder. The skin and subcutaneous flaps are closed if possible in a single layer of silk mattress sutures no catgut is buried. If much skin has been lost the closure is difficult or impossible even after wide undercutting of the flaps. In the event of incomplete dosure the edges are approximated as well as possible and vaseline dressings are applied without any form of skin-grafting A moderate pressure dressing with cotton waste follows. The lumb is enclosed in plaster from upper thigh to toes with ankle at right angles and knee in 10 degrees flexion A long window is

cut over the incision but it is left unopened. These principles of technique are similar in the thigh and upper limb fractures, differing only in size of plate, and approach. Splain anesthesia is used for all lower limb cases cyclopropane and oxygen are chosen for those of the upper limb. All patients receive whole blood or plasma transfusion during operation.

## POSTOPERATIVE

The preoperative regimen outlined is resumed. In most instances the sulfonamides

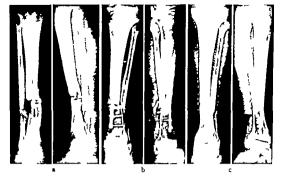


Fig. 3 Case 3 a, Preoperative views, b immediate postoperative views. Note that the screws could not be used in lower fragment due to marked osteoporosis. c, Twelve months postoperative. Plate was previously removed at tendinoplasty

are discontinued in the second week. The wound is inspected on the sixth day through the window and if there is any sign of in fection several central sutures are removed and warm saline compresses are applied Otherwise, all sutures are removed on the ninth day A walking plaster cast extending from the knee is applied in 5 to 6 weeks and remains present until end of third month

HICKS

## ILLUSTRATIVE CASES

Case 1 An infantryman received an explosion wound and was operated upon here 17 months fol lowing trauma Examination revealed a compound fracture of both bones of leg with skin defect and discharging ainus from nonunited infected tibial fracture the fibula was partially healed by fibrosis Following operation, the wound healed completely The use of walking callper splints was begun in sixth postoperative week patient was walking with out any support 12 weeks postoperatively with moderate evening ankle swelling. There were no signs or symptoms for 3 years postoperatively

Total limb shortening was 11/2 inches (Fig. 1)

CASE 2 Patient was injured in a plane crash, and was operated upon here 11 months following original surgery He also suffered fracture of other leg and skull. Examination revealed compound fracture of both bones with nonunion very profuse purulent discharge with skin defect and projecting bone plate esteomyelitis of tibial fragments only Following operation slight serous discharge con tinued only 10 days through the skin defect wound

was completely healed in a weeks. Walking by caliner splints was begun in fifth postoperative week Patient was walking very freely without support by twelfth postoperative week. He was accepted for duty in Merchant Navy 8 months after operation. He had no complaints 2 years after operation Total shortening of limb was 1 inch (Fig 2)

CASE 3 Patient was injured in a mortar ex plosion. He was operated upon here 14 months Examination revealed a com following wound pound fracture of both bones with nonunion chronic esteemyelitis and sequestration at both tibia and fibula fracture sites tibialis anticus and extensors all destroyed moderate skin defect. There was a moderate amount of purulent discharge from the wound After operation the wound healed com pletely Walking by caliper splints was begun 6 weeks after operation Patient was walking with no support to leg but foot straps in 15 weeks. There was no evidence of infection etc. 2 years following operation Function was restored by tendinoplasty Total shortening was 134 inches (Fig 3)

CASE 4 Patient was injured in a plane crash. He also sustained fracture of pelvis and hip dislocation. He was operated upon here 3 months following trauma Examination revealed a compound fracture of the tibus with grossly infected fragment ends fibular fracture not infected. There was no sign of attempt at union and a discharging skin sinus was present. The wound healed after operation by primary intention Walking by caliper splints was begun in 8 weeks its application was delayed by other fractures Walking without support was other fractures possible in sixteenth week and he was returned to duty Total shortening 14 of an inch No desability for past 2 years (Fig 4)



Fig. 4. Case 4. a, Preoperative views b, immediate postoperative view —note lower leg fractures also c, 6 months postoperative.

CASE 5 Patient was injured in a motor accident. One sequestrectomy had been performed. He was operated upon here 6 months later for fail lumb with discharging suns. Examination revealed non-union with chronic infection of tibus and sequestration. Osteotomy of both bone was performed. The wounds healed without complication. Walking cast was applied in 5 weeks he was walking without support 3 months after operation. Total shortening was 1 inch. Elective removal of plate 2 cars later revealed perfect union without evidence of infection. Full duty performed during the past 2 pars without

symptoms (Fig 5)

CASE 6 Patient was injured in a plane crash and
suffered compound fracture of both bones with
ulcerated discharging wound and faul-limb Opera
tion was performed here; smonths following accident.
Examination revealed nonunion with sequestra and

small loculations of pus about the tibal fragment. The lower fragment was markedly osteoporotic. Following the osteotom the upper fibrilar fracture was placed across the tibal fracture. The wound healed completely A walking cast was applied in fifth week and all aplinting was removed after 3 months. Patient was on full flying-duty 7 months after operation. Total shortening was 1 inch. Plate was removed for inspection; 2 year later no residual infection was evident. He has had no complaints for past 2 years. (Fig. 6)

past a years. (rig o) resented for comparison. CASE 7. This case is presented for comparison. Patient was injured in a motor crash. He also suffered a fractured spine. He had had a series of previous sequestrectomy operations. Operation was performed here a vens following julyo. The findings were compound nonunited fairl-fracture of this with outcome chits and sequestration fields:

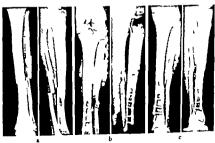


Fig. 5. Case 5. a, Preoperative: b, month postoperati

year postoperat

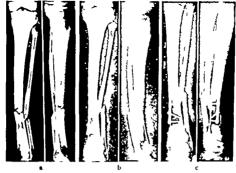


Fig 6 Case 6 a, Preoperative views b 5 weeks postoperative c, 1 year postoperative.

fragments partially united and not infected. Also profuse discharge through multiple skin sinuses. In this case the usual osteotomy was not performed due to extensive sclerosis of large intermediate tibial fragment. The necrosed bone and infected soft tissues were thoroughly excised plate was applied for stability The wound healed primarily one month postoperative a single small sinus formed and intermittently recurred for 11/2 years but discharged only spots of thin serum Bone union progressed slowly Patient walked without support in twelfth postoperative week to shortening Plate removed recently and bone was seen to be healed securely

CASE 8 Patient was injured in a plane crash He suffered compound fractures of both femora Both bones were plated The right femur united firmly with marked lateral bowing. The left femur was infected and nonunited. He was operated upon here 8 / months later The findings were flail limb with gross infection of fragments, sequestration, and discharging sinuses Considerable pus and marked loss of bone substance were noted bone plate was very loose. The plate was removed and an osteotomy and plating were performed wires were also used because of marked osteoporosis Patient re fused spica and only posterior thigh mold was used The wound discharged small amount of thin pus for

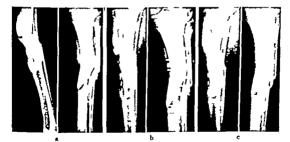


Fig. 7. Case. a, Preoperative view. b, Tw. months postoperatille c. Six months post operative



Fig 8. Case 8. a, Preoperative view b, s1/2 months after operation. N evidence of infection about the acrews. Usual changes for this period at esteotomy site.

3 weeks then healed completely. An ischuumbearing walking caliper with crutches was allowed 6 months after operation. Patient refused further plastic bone repair and was transferred. When reexamined a vear later he was walking with a cane but no recurrence of infection was evident. Limb shortening was not significant as the opposite femoral bowing compensated (Fig. 8).

CASE 9. Patient was injured in a motore; cle accident. He received a compound fracture of the middle third and simple fracture of metaphysis of left femur. The upper fracture failed to unite the lower one besiled. Operation was performed of months after accident. The findings were No dead charging sinuses were noted but severe to have a supplied to the proving pus pockets about fragment. There was placed anteriorly away from with the total placed anteriorly away from with the position. The wound healed completely. Posteron body was was applied at 3 months. A wailing calper splant was applied at 3 months and patient not provided to the position of the plate was removed for in spection 11 months after. He has had no complaint for past 16 months. Total shortening was 114 months. [Fig. 6]

inches. (Fig. 6.)
CART to Pattent was injured in a motor actident. Two subsequent sequestrectoms operations had been performed. He was operated upon here; months following accident. The findings were compound fractures of both hones with disult radial fragment extruding and chronic infection of fragments of radius and of soft theuse. Filld insert the finding such that the sequence of the sequenc

duty as coal stoker (Fig. 10)

CASE 11. Patient was injured in a motor crash.
Compound fractures had been open): reduced. He
was operated upon here 4 months after accident.
The findings were Compound fractures of both
bones of forearm with flaid nonumon. Chomoic infection of fragment ends with small sequestra and
wire through ulns sinus over dorsom of ulns. Following operation the wounds healed completely
splunting was substituted by aling in, weeks. All
movements were complete. Plates were removed 4
months after operation without signs of infection.

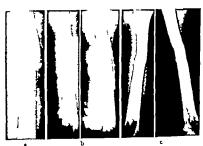


Fig. 9. Case 9. a, Preoperative views b, 1 day postoperative c, 11 months postoperative



Fig. 10. Case 10. a, Preoperative views b Two and one half months postoperative c, One year postoperative.

Three years have passed without disability Total shortening was 14 of an inch (Fig. 11)

#### OBSERVATIONS

This is not an established method of treat ment and will undoubtedly be the subject of considerable diversion of opinion. Although exceptionally good fortune attended the patients, precisely the same sequence of events was noted in the clinical and x ray progress toward secure union without undesirable sequelae in no instance has there been oc

casion to regret the procedure. It did not seem that a lack of bone-forming capacity existed once the grossly infected sequestra and soft tissues had been removed and vascular bone fragments were properly immobilized in apposition.

Without embarking upon discussion as to the etiological factor in the nonunion in these cases beyond the common one infection histories indicated that interrupted skeletal traction had most commonly occurred In adequate fixation which is the expected

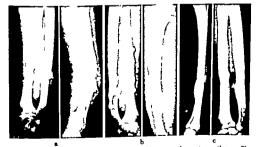


Fig. 11. Case 11. a, Preoperative views b, Three months postoperative c. Six months postoperative

accompaniment of mobile war plus a low vitamin C intake were strikingly constant.

While for the most part the ages of the patients were below 35 years, others represented the fourth and fifth decades

The infection unlike blood borne osteomyelitis, was limited to the fragment ends and to surrounding soft tissues containing smaller loose bone and therefore afforded opportunity for excision. The marked bony eburnation and surrounding avascular fibrosia inhibited elimination of infection solely by chemotherapeutic measures. Organisms were mixed with staphylococci predominating ac companied by streptococci saprophytic or ganisms, Bacillus pyocyneus, and rarely Bacillus coli

In no matance was there evidence of post operative dissemination of the infective or ganisms, or a tendency toward local spread

Importance of local or general administration of chemotherapy must not be over stressed in several of the most grossly infected cases use of drugs was omitted totally because

of previously determined allergy

There have been no residual sinuses or other unfavorable sequelae in those cases in which the full procedure could be performed Case 7 is given as example of failure to eliminate completely infection in an instance in which an extensive osteotomy could not be done osteogenesis was very slow and the bone spanning the infected area appeared sclerosed and brittle. The plate remained firm and maintained immobility during the lengthy healing period Case 8 primarily very grossly infected eliminated the infection vers quickly and united in spite of small surfaces of bone apposed. In this instance the procedure quickly afforded the abandonment of skeletal traction and eliminated the external reinfection of the wound This latter factor is considered to be an important accomplish ment of this procedure.

Postoperative pain was noted by its absence.

From x ray and later operative examination there is reason to believe that the enclosed metal does not form a formidable midus for bacterial growth. Alarm that plates maintain the fragment ends in dis-

traction during the early physiological period of resorption resulting in non-union is not justified by serial roentgenograms in the cases reported here given time firm unlon occurred. While the plates merely act as splints they can be credited with allowing security over the increased fragility period of bone healing and they allow considerably earlier movement of adjacent joints. (Particularly the ankle and foot.)

Several plates were removed to allow examination of the local area to verify complete absence of latent infection. The screw holes did not fail to heal. Operation for plate removal in these cases is deemed unnecessary.

It will be noted that some bone loss or curred at the original injury the operation further subtracted from the limb but the average total loss in length was r inch and did not exceed 11/4 inches. It must be remembered that a certain amount of length loss is also an accompaniment of a simple bone grafting procedure in such cases, if the sclerosed bone ends are carefully resected The shortening in this small series was compensated by the wearing of shoe-lifts which proved to be comfortable and nondisabling. The lower limb cases have been free of complaints, and follow up observation of their backs and pelves fails to elicit distortion of normal alignment

#### RUMMARY

1 A single stage operative method of management of chronically infected fractures with nonunion is considered

2 The procedure which is performed during the quiescent stage, consists of an exacting excision of infected tissues to create a new vascular bed followed by plate fixation for immobilization

3 The progress of bone and soft tissue healing is favorably comparable to freshfracture healing

4 Cessation of local infection and absence of discrimation are noted the factor of latent infection is negligible.

5 The limb shortening is minimal and is compatible with normal activity and comfort 6 The procedure hastens local and general

rehabilitation and helps patients morale

## THE SAPHENOUS VENOUS TRIBUTARIES AND RELATED STRUCTURES IN RELATION TO THE TECHNIQUE OF HIGH LIGATION

Based chiefly upon a study of 550 anatomical dissections

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ECENT medical literature contains many articles on the treatment of varicosities of the veins of the lower extremity However little has been written about the tributaries of the upper por tion of the great saphenous vein or about related fascial structures. Since attention is necessarily focused upon this area in the treat ment of varicosities knowledge of the com moner types of venous patterns and of vanations in form and size of the fossa ovalis should be of service to the surgeon

The present account deals with vascular varieties to include the following superficial vens iliac circumflex external nudendal epigastric, lateral and medial accessory saphe nous veins. In addition the observations have to do with the fossa ovalis and its contained femoral vessels, with the overlying and surrounding fascial layers and with some rec ommended features of surgical technique which are in the main based upon the anatomical aspects of the study

#### MATERIAL AND METHODS

All anatomical observations were made on dissection room specimens (American whites and negroes preponderantly male) observations on fascial layers were made con currently with those on the blood vessels covering 350 consecutive body halves. The statements on form and size of the fossa ovalis and on the relations of the femoral vessels are taken from an earlier investigation cover ing 200 consecutive lower extremities (Anson and McVay 1938) those on structure of the femoral sheath are based upon a study of the

Contribution No. 415, from the Anatomical Laboratory Northertera University Medical School.

anatomy of femoral hernia (in preparation Anson Ashley Reimann and Beaton)

A sketch of the subcutaneous veins of the inguinofemoral region in each of the 350 thighs was prepared Accessory venous tributaries entering the great saphenous vein more than 6 centimeters below the junction with the femoral were not considered selecting the anatomic types of venous convergence upon the main saphenous vessel those records represented the specimens types therefore were not selected early in the study from a limited group, and then set up as categories into which later cases were fitted

The illustrations in Figure 2 are diagram matic, the distance between tributanes and the caliber of the latter being arbitrary Those in Figures 1 3 and 4 represent actual specimens. The illustrations in Figure 5 are based upon e and g of Figure 3 ligatures are placed at points which, in the experience of the senior author would have been selected in actual surgery of the case

#### OBSERVATIONS AND DISCUSSION

#### I ANATOMY

The anatomical material will be presented in the order in which the sets of layers or groups of vessels are encountered in dissection first will be considered the superficial fascia next the superficial veins, finally the deep fascia with its fossa ovalis and the contained femoral vessels.

a Superficial fascia Over the proximal third of the thigh in the area of the femoral triangle the superficial fascia is two-layered just as it regularly is in the adjacent inguinal and perineal regions (McVay and Anson 1038 and 1040) The outer superficial layer

TABLE I

Type	Right	Left	Materal	Per Cent
I	1.1	4		14 M
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IV				6 00
v	1	4	-	77
VI	60	n n	•	21 43
VII		J		3.00
VIII	9			7 71
Totals	\$0	70		

of the bilaminar superficial fascia is a fatty stratum, while the inner deep layer is fibrous the latter contributes to the formation of a strong membranous investment for the larger vessels of the thigh. It is rather readily separable from the outer adipose layer (Fig. 1 a and b) In addition to the superficial veins the subinguinal and inguinal lymph glands are situated in this deep membranous straturn which, in the femoral triangle some times contains an appreciable deposit of fat When followed into the fossa ovalis, and therefrom proximalward under the inguinal ligament, the fibrous laming is found to become the femoral sheath (Fig 1 c and d) At the inguinal ligament it is continuous with the plate of non fatty tissue which houses the iliac vessels and with the fascial coverings of the abdominal aponeuroses.

In this way the femoral vessels are protected as they lie within the fossa below the level of the falciform margin the saphenous and its tributaries are nearer the skin, yet course along the fascia lata where they are lodged in the fibrous layer of superficial fascia and covered by the fatty stratum

b Superficial veins. Before presenting original observations on the suphenous tributaries, it will be helpful to review briefly the standard descriptions of these channels.

The superficial circumflex lilac vein is regularly described as a small but quite constant, vessel which drains the area superior to the lateral half of the inguinal ligament and as far lateralward as the anterior superior spine of the illium. It is said to be only occasionally duplicated. The vein courses inferomedially

crossing the inguinal ligament obliquely enroute to the fossa ovalis, where it may term nate in the great saphenous the femoral the superficial epigastric, or the lateral accessory saphenous vem

The superficial epigastric vein is likewise amall. Arising in the umbilical region some times through anastomous with the thoraco-epigastric vein the vessel courses inferolaterally over the medial half of the inguinal lagament to the fossa ovalls. Here it empties into the saphenous vein into any one of the latter a tributaries, or into the femoral directly. It may anastomose across the linea alba, with the companion vessel of the opposite aide or may communicate with the dorsal benile vein.

The external pudendal is a continuation of the anterior scrotal or labial veins it commonly receives communications from dorsal penile or cittoridal vein and from vessels of the hypogastric region. At the fossa ovalis the pudendal may empty into the great saphenous vein or the femoral or any near tributary (superficial engistric or accessory subneposis)

Exceeding the above mentioned vessels in sure, is a vein which is sometimes termed internal accessory suphenous. This vessel quite constant in occurrence originates in a suprapatellar network gathering branches from the anterior and lateral surfaces of the thigh. It inclines medially in ascending to the fossa ovalis, where it is likely to empty into the superficial circumfer illac vein or into the

great saphenous vein.<sup>1</sup>
The medual accessory saphenous vein is by far the least constant of the proximal femoral group. It drains the posteromedial surface of the thigh and is directed anterosupenorly to terminate in the great saphenous vein. When such an accessory vessel ascends into the proximal one-fifth of the thigh it usually receives the external pudendal vein near its terminus.<sup>2</sup>

This need has been previously described by atmerous arrestgators under the names of external apperium formed was (Persol, learning superfund housed year and lettral femoral circumsters on (Commislians), accessory replaces were (Tabiler), and asternot supherous was

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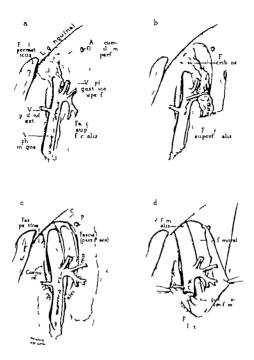


Fig. 1 Investments of apphenous and femoral venus successive stages of dissection from superficial facia (a and b) to fascia late and femoral sheath (c and d). In Figure 1s, latty layer of superficial fascia has been removed at fossa ovalus to expose membranous layer where it embreaths apphenous venu. Figure 1b fatty layer reflected from area lateral to fores a token fascion margin and superior cornu adipose layer is perforated by apphenous tributanes to form fascia cribrota, and is continuous with similar itsue in depths of fossas. Figure 1c, fatty layer entirely removed to demonstrate manner in which immediately subjacent deep layer of fascia forms a complete sheath (here opened) for femoral vensels. Figure 1d sheath further exposed by cutting it beneath incided distal edge of falcialorum margin.

While such descriptions account for common anatomical features they leave unrecorded some important details of morphology and incidence of common departures from the anatomic normal. These data will now be presented from the authors observations. The patterns formed by the five major tributaries of the proximal part of the great saphenous vein are numerous. There is, how ever a marked tendency for two or more of these vessels to fuse into a common venous trunk before entering the great saphenous vein

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VI	60	ภ		1143
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vin		3	5	71
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crossing the inguinal ligament obliquely en route to the fossa ovalis, where it may terminate in the great saphenous the femoral, the superficial epigastric, or the lateral accessory saphenous vein

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The external pudendal is a continuation of the anterior scrotal or labial veins it commonly receives communications from dorsal penile or clitoridal vein and from vessels of the hypogastric region. At the fossa ovalis the pudendal may empty into the great saphenous vein or the femoral, or any near tributary (superficial epigastric or accessory saphenous).

Exceeding the above mentioned vessels in size is a vein which is sometimes termed lateral accessory saphenous. This vessel quite constant in occurrence originates in a suprapatellar network gathering branches from the anterior and lateral surfaces of the thigh. It inclines medially in ascending to the fossa ovalis, where it is likely to empty into the superficial circumflex iliac vein or into the great sophenous vein 1

The medial accessory suphenous vein is by far the least constant of the proximal femoral group It drains the posteromedial surface of the thigh and is directed anterosuperioriy to terminate in the great saphenous vein. When such an accessory vessel ascends into the proximal one fifth of the thigh, it usually receives the external pudendal vein near its terminus.2

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unhanous veins, are confluent (Fig. 2c), the indence of this arrangement is 13 I per cent (46 cases, 25 right, 21 left, 2 bilateral)

In type IV the two regular medial veins mmely, superficial epigastric and superficial external pudendal veins, fuse before entering the great saphenous vein (Fig. 2d), incidence 6 per cent (21 cases 10 right, 11 left, 2 bi lateral) This vascular pattern occurs fre quently in association with fusion of the two lateral branches (superficial circumflex iliac and lateral accessory saphenous veins) the combination is catalogued as type VIII

Type V includes cases in which an accesory medial suphenous empties in common with the external pudendal vein into the great suphenous vein (Fig 2c) incidence 77 per cent, (27 cases 13 right, 14 left 3 bilat eral) In a few instances the medial accessory resed is present with one or the other of the remaining types, but so rarely that elevation to the status of a separate type is not war ranted. A lateral accessory saphenous vein only rarely accompanies a medial accessory uphenous (2 in the 27 cases) This would suggest that when a medial accessory vessel apresent, the lower femoral tributaries of the great saphenous vein drain the region usually cared for by the lateral accessory vessel.1

Specimens designated as type VI are char actenzed by a fusion of the three lateral tributanes, namely the epigastric, circum fer iliac, and lateral accessory saphenous the ungle vein thus formed drains into the great aphenous. This pattern is, by far the com monest encountered in the current study (Fig 2f) incidence 33.4 per cent (117 cases,

60 right, 57 left, 19 bilateral) In specimens of type VII an unusual plan of fanon occurs the superficial epigastric and the lateral accessory saphenous veins join over the fossa ovalis to terminate by a common stem in the great saphenous vein while the drounder iliac vein and pudendal veins end adependently in the main venous trunk (Fig 8) madence, 20 per cent (7 specimens 4 nght, 3 left, none bilateral)

In type VIII dual fusion takes place the occumiler iliac and lateral accessory saphe Touly the prast suphenous win division bewer in the leg or rectives and hearing lower in the leg from the region drained by the model onesay suphenous win.

nous veins on the one side and the external pudendal and epigastric veins on the other form lateral and medial common tributaries respectively (Fig 2h) incidence 7 7 per cent, (27 cases 9 right, 18 left, 5 bilateral)

Viewing the specimens as a group, some additional facts are evident. The tributary most frequently duplicated is the external nudendal vein (54 instances in 350 thighs) however, triplication is rare (2 cases) The next most frequent duplication is that of the superficial circumflex that vein which occurs in 48 per cent of thighs (17 cases) in over half of these the supernumerary vessel empties into the femoral vein directly. The circumflex iliac is tripled in but one instance Termination as a single vessel in the femoral vein occurs in 17 per cent of specimens (6 cases) The superficial epigastric vein is in frequently doubled the arrangement occurs in only 3 r per cent (11 cases) it is never tripled and is absent in only 1.4 per cent (5 cases) The lateral accessory saphenous vein is duplicated in approximately the same num ber of cases (10) never present in triplicate?

The actual specimens, upon which the dia grammatic figures (Fig 2a to 2h) are based present some details of form which require special consideration Small veins from nearby lymphatic glands are common (at asterisks Fig 3) Not infrequently tribu tanes enter the saphenous through a bay like trunk 'as an intermediary (Fig 3a) so that the confluence may be regarded as formed by two tributanes (type II) or by three (type VI) In the present study vessels were con sidered to empty separately if their common trunk measured less than 2 millimeters in length Transformation readily occurs when the bay' is widened (type I into type VI Fig 2i) Surgically the distinction is unim

The division made by Pairler and Charpy of the superdial religiation with little and the pairle of the superdial religiation with little and account of the control with little and account of the control positional and accounty with (as suscided with the extent positional with on the control positional with one control positional with one control positional variable and the control of the control positional formed to be control to the control of the control company in the propert authority extends a superdial position of the importance of the factor to superdial control company in the propert surface steels, in the factor in the Birth Attendialogy beautiful (qu) has projected out the importance of this stand weed from The lateral superdial connections of the dones superdial with of the present charmed of typing. When such connection satisfy, it is by way of either single or dealer surface polymerate with the lift side as was brought out by Ontal (quoted by Policier and Charpy)

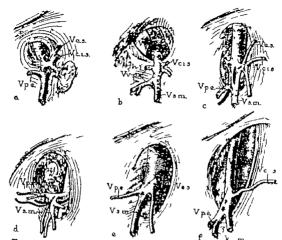


Fig. 4. Types of fossa ovalis, with related vessels. Figure 4s, smallest fossa, Figure 4b, small diredlar fossa, with femoral artery fully exposed. Figures 4c and 4d, large oval fossa, with femoral artery concated and femoral vein wholly or partially exposed, suphenous vein receiving deep tributades within fossa. Figure 4c, large eval fossa, with tateral half of artery concated by facilitors margin Figure 4. largest fossa (in soo) with artery fully exposed. Adapted from Anson and McVay 1005.

ceived (Fig 3d) These may be received prominally rather than distally with the result that several veins from a region converge upon a short trunk (Fig 3d) When a vein drains one area chiefly, but closely skirts another it may receive a tributary from the latter for example an extra epigastric may enter the circumfex flic (Fig 3e) Almost always the accessory saphenous veins are much smaller than the great saphenous. With similar degree of constancy tributaries empty into the saphenous (separately or by conjunct trunk) on their own side of the chief vessel Rarely however the superficial epigastric crosses to the lateral side to end on the opposite aspect of the saphenous (Fig 3g)

It is important, surgically to know over how great a length of the saphenous vein tribtuatics of the proximal group will enter the main channel. In a consecutive series the distance from the termination of the femoral to the most distally placed tributary was 1 centimeter or less in 15 per cent of cases 11 to 15 centimeters in 26 per cent 16 to 2 in 24.5 per cent 2 1 to 5 in 16 per cent, 2 6 to 3 centimeters in 9 per cent, 3 1 to 3 5 centimeters in 5 per cent, 3 6 to 4 centimeters in 3 per cent and over 4 centimeters in only 1 per cent. This means that in the great majority of cases (96 per cent) the tributaries are received by the saphenous vein in the last 3 5 centimeters of its length, close to or directly over the fossa ovalis.

c. Fosis oralis and femoral resids. The fossa ovalis is regularly pictured as an elon gated fault in the fascas lata situated just distal to the inguinal ligament, and as being considerably larger than required for transmission of the saphenous vein In some illustrations in standard textbooks, the felci

form margin is shown extending lateralward to cover the femoral artery in others, ap proximately half the artery's width is exposed beyond the free margin of the fossa. Actually both arrangements are common

In an earlier study conducted in the laboratory (Anson and McVay 1938) on 200 thighs, the smallest fossa en countered measured 1 6 centimeters in length and was circular in form (Fig 4a) the largest was 8 5 centimeters long and 3 5 centimeters wide (Fig 4f) In 90 per cent of the specimens the length was between a centimeters (Fig 4b) and 6.4 centimeters (Fig 4e) the average length was 4.6 centimeters. In 87 per cent the width was between 30 centimeters and 15 centimeters the average width was 2.8 centimeters. The femoral vein was found to be exposed through its full width in virtually every specimen. In 83 per cent of 100 consecutive specimens the femoral artery also was wholly or partially exposed. More specifically in 36 per cent three-fourths to all of its width was in view (Fig 4f) in 30 per cent, one-half to one-fourth (Fig 4e) not infrequently (17 per cent) the artery was fully exposed with space remaining between the vessel and the margin of the fossa (Fig 4b) In some cases venous tributaries were found to come forward through the fascial floor of the fossa to empty into one of the lesser tribu tarles or into the saphenous itself (Figs. 4c and 4d)

2 SURGERY

It is established beyond threat of denial that a surgical technique is best when it pays greatest heed to the normal fabrication of the human body. By the same token it is true that refinement of anatomic concepts of structure makes for less disturbing surgery When a particular method depends heavily upon anatomical descriptions and figures of stereotyped order-such as are found in standard textbooks—the possibility of tech nical improvement is decreased, and the surgeon a feeling of security is, as a conse-quence lowered But when on the contrary the surgeon is armed with detailed foreknowl edge of common variation in structural pattern and has access to actual pictorial rec ords of paramount features in their most frequent interrelationships, he is equipped to move with ingenuity and surety

In treatment of varicosities of the suphenous vein and its tributaries, by high ligation, the akin incision begins at the level of the in guinal ligament 2 5 centimeters medial to the femoral artery the pulsations of which are palpable from the surface. An incuion 5 centimeters long is found to give satisfactors exposure of the saphenous vein in its proximal portion where tributaries reach the areas of torcular' junction of the saphenous and femoral veins.1 The incision should incline slightly medialward as it descends, to match the long axis of the saphenous vein which departs from the less oblique one of the femoral vein. As mentioned earlier the suphenous vein hes in the deeper layer of the superficial fascia The chief tributaries are lodged in this layer as are also the lymph glands and their arteries of femoral source and their veins of femoral or saphenous termination. means that the incision may be carned quite safely through the superficial fatty layer of

the superficial fascia. The saphenous vein is next freed from its fibrous covering of fascia from the point of entrance into femoral downward for a distance of 3 centimeters or more. It is readily distinguished from the femoral vein since the latter lies not only subjacent to the saphenous, but under the superior and inferior margins of the fossa ovalis in which situation it is invested by a fairly heavy prolongation of the femoral sheath. The stripped length of 3 centimeters is almost always sufficient to ex pose all of the converging tributaries in the present authors studies it was found that the area of reception of tributary veins rarely exceeded that length.

Since any or all of these tributaries may open into the broadened suphenous at its junction with the femoral the confluence is then to all intents and purpose with the femoral itself. From the surgical standpoint this means that it is unsafe to ligate the saphenous only the tributaries should be

He this end is preceding parts of the discussion the account of technique has been adapted from Ochoner and Mikerner received months principle the otherwises are naturely see the loant contribution as attended to the loant contribution of a serveral co-outlants of the present article, while the weight load of the loant open discoverables and the first large article and per load of the loant again and heart place and the Th. E. H.

heated separately (Fig. 5). At first sight it might be considered satisfactory to lighte the confluent channel (cf Fig 2i) Actually how ever such a procedure would be venturesome since the channel being short might not re tain a ligature after excision of a segment of the great saphenous vein (see hereinafter) All of the tributanes of the saphenous should be ligated, since unligated veins even when small, are likely to bring on recurrence of the varicosities especially in the case of the lateral accessory branch. It is worth record ing that several cases have been observed in which large lateral accessory branches have been mistaken for the great saphenous ven and brated in its stead, and that lateral accessory suphenous branches which are equal to or larger than the great saphenous trunk are not uncommon

In mobilizing the saphenous vein and its satellites it is advisable to free the vessel somewhat from its enheathing tassue proximalward to its point of junction with the femoral in order to be certain of the position of the latter. Failure to make adequate exposure in a case recently observed, led to misidentification of the femoral vein mistaken for the great saphenous the femoral was ligated and severed.

It is important to realize that varicese dilatation of a tributary may simulate hernial enlargement, when the swelling lies over or near the feasa ovalis. One of the authors has seen a case in which enlargement of the superficial circumflex iliac vein was incorrectly diagnosed as a femoral hernia.

Regardless of whether the tributanes be closely grouped in turcular fashion or segregated, a segment of the saphenous trunk should be removed (between proximal and distal higatures) to render improbable regeneration and re-establishment of viascular connections (Fig. 5). Simple ligation without severance of the saphenous vein or of its stributanes is likely to result in recurrence of varionaties. The proximal ligature should be placed as near the point of emptying of saphenous into femoral sis is technically possible. When a long proximal stump of the saphenous remains the possibility of thrombosis, with subsequent embolism, is greatly increased.

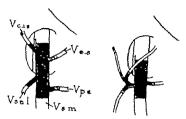


Fig. r. Technique of high ligation of saphenous vein and tributaries two patterns of venous pattern shown. Stippled area indicated segment to be removed after ligation.

Removal of a segment of the saphenous is the only dependable way of providing a substitution valve in the territory of the saphe nofemoral nunction. Because varicosities in the saphenous system are the result chiefly of valvular incompetence at the saphenofemoral junction ligation of proximal tributanes only would bring relatively slight hydrostatic rehef to the main recipient vein (i.e. saphe fauou. But when the saphenous (with its weakened valves) is ligated and cut, recur rence is obviated the most troublesome segment has been extirpated and the vascu lar stream has been strongly diverted through numerous lesser channels whose structure is less impaired

Several additional anatomical features require practical consideration. These are the regular presence of branches of the femoral artery in and near the fossa ovalis the exposure of the femoral artery itself within widely open fossae the occurrence of communicating veins from deep (muscular) level and of veins received from lymphatic glands.

The arteries referred to are those for which the veins herein considered serve as vexice consider. Usually they match each other in course. Sometimes, however the arteries pass beneath the saphenous en route to their areas of inguinal, femoral or pudendal supply or emerge through lesser hiatuses in the falci form margin of the fosse ovalus being thus unpredictable in position. This feature coupled with the fact that they are occasion ally large makes it advisable to exercise care.

in mobilizing the tributary veins where they reach the fossa. Transection of the arteries

could cause troublesome bleeding

While the femoral artery is more likely to be beneath the deep fascia at the falciform margin than to be exposed medial to the lat ter's free edge, instances are not uncommon in which the latter arrangement obtains (Fig 4). In rare unstances the artery is exposed in full width and for a length of 8 centimeters or more. Although fossae tend to be wide when they are long and hence assume an oval out line, exceptional width may be exhibited by fossae of ordinary length—so that the femoral artery less unguarded in a circular fossae.

It is well known that communications with veins of muscular level occur at variable in tervals along the entire course of the greater and lesser saphenous veins they pass through small histures in the pedal crural and femoral portions of the deep fascial investment of the lower extremity. It is not generally recognized however that vessels of communicating type may occur within the confines of the fossa ovalis. Such vessels emerge through the pectineal fascia on the floor of the fossa, to terminate quickly in the saphenous vein (Fig. 4c and 4d) or in the femoral. In anchoring the saphenous to subjacent veins they render mobilization of the vessels more difficult.

Veins draining the lymph glands of the inguinal and subinguinal groups are regularly of dissectable size and occasionally as large as the epigastric and circumflex lihac veins (Fig 4a). They could cause troublesome bleeding were they inadvertently cut and left unligated. The same would apply to transection of the companion arterial branches from the femoral.

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#### CONCLUSIONS

In a study of the subcutaneous veins tributary to the great saphenous vein at or near the latter a termination in the fossa ovalis, it was found that vascular patterns (from 350 thighs) could be arranged in eight general types according to the degree of complexity and of tributary fusion. Fusion of two ad jacent tributaries entering one side of the saphenous vein occurs very frequently fusion to produce a common trunk on each of the two sides in the same specimen is uncommon as is also independent termination of all tribu tanes. However no matter whether conjunction or separateness obtains, the tribu taries enter the saphenous vein over the area of or just distal to the lower margin of the fossa ovalis in more than half of the cases they enter the suphenous in its upper 2 centimeters, and rarely over an area greater than 3 5 centimeters in length (measured down ward from the femoral termination of the saphenous) These observations mean, sur gically that the area of required exposure of the suphenous vein need not be extensive a length of approximately 4 centimeters would be more than adequate in most instances. Width of the area would be governed by the type of tributary pattern revealed in tracing the veins peripheralward from their terminations.

These venous channels from abdomenperincum and thigh are lodged in heavy fibrous tissue which lies just external to the deep fascial investment (fascia lata) of the musculature of the thigh only their lesser tributaries course through the fatty pannicle from subcutaneous level. As the larger vems (epigastric, pudendal, etc.) approach the saphenous, the fibrous tissue forms for them a grossly demonstrable coat, which, traced with them into the fossa ovalis, becomes the strong femoral sheath. This sheath is actually bilaminar its outer lamella being a prolongation under the inguinal ligament, of the tranversalis and iliac fasciae, its inner lamella being a similar derivative of the heavy fibrous layer of retroperitoneal times. The main venous tributaries of the saphenous thus lie next to the fascia lata, their depth below cutaneous level increasing with obesity of the subject. The femoral vein is situated on the floor of the fossa, upon the fascia covering the pectineus muscle its free (anterior) sur face is flush with the plane of fluc (lateral) portion of the fascia lata where the latter forms the falciform margin of the fossa. This is tantamount to saying that, from the surgical standpoint, the veins which come into the field of varicosity ligation are predictably located in relation to fascial planes, and, to some extent, protected from inadvertent transection. The femoral artery in more than

three fourths of cases is exposed within the fosas (i.e. extends medially beyond the falci form margin) for part or all of its width-a circumstance which requires care in dissect ing down upon the adjacent femoral vein

The regular occurrence of iliac epigastric. and pudendal branches of the femoral artery and the occasional presence of intrafossal venous tributaries from muscular sources are additional anatomical features which in crease the need for surgical caution

#### REFERENCES

I Arrow B J., and McVay C. B Anat. Rec., 1018, 72 399-404

- EDWARDE, E. A. Surg, Gyn. Obst., 1934, 59 916-918
   MARORIUE, H. R., and Ocument, A. Ann. Surg.
- 2055, 107 027 4. McVAY C. B and Amson B J Anat. Rec., 1958,
- 71 401 407
  5 Did., 1940, 76 213-231
  6. Octobers, A., and Masoness, H. R. Varicose Veina.
- COMBINER, A., and MASCURER, H. E. Varicese Veira.
  St. Louis C. V. Moshy & Co., 1939
   PITEROTI, H. Human Anatomy Philadelphia and London J B Lipplocott Co., 1931.
   PORTIER, P., and CHASPY A. Traité danatomie Immaine, Par., 1920. Vol. 2 pt. 3.
   ROBISSION A. (edited by) Cumlopham a Testbook of Anatomy 5th ed. New York William Wood & Anatomy 5th ed. New York William Wood &
- Co., 1910
- 10. Tambier, H. Lehrbuch der systematischen Anato-
- nie Leipzig Vogel, 1019.
  11 Totor, C. An Atlas of Human Anatomy Edited by D E. Paul. New York Rebman, 1919

### THORACOABDOMINAL WOUNDS

## A Review of 270 Cases

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HIS report is a review of patients with thoracoabdominal wounds admitted to a General Hospital in Italy between November 16 1943 and February 28 1945 The data were obtained from a survey of the total admissions of Amer ican or Allied troops. During this period 270 patients were admitted with the diagnosis of one or more perforations of the diaphragm. This number represents an incidence of 1 per cent of the total of 26,852 patients admitted, and 1 o per cent of the total of 14 112 patients who were either battle casualties or injuries. The report does not include a rather large number of patients who had separate pene trating wounds of the abdomen or chest. It reviews only those patients who had a per foration of the diaphragm by a metallic for eign body

Between April 1 1944, and December 90 1944 this hospital functioned as an active chest center During this period there were exactly 1 000 patients admitted to the chest service. One hundred and eighty two 18.2 per cent of these patients so called chest cases, had thoracoabdominal injuries.

All patients in this series were white males except one a negro. Their average age was in the low twenties.

Fifty two cases 19.3 per cent, were due to machine gun or gunshot wounds, and 218 80.7 per cent, were due to shell fragments.

The report will be discussed under the following division (1) type and incidence of traumatic lesions, (2) therapy in forward hospitals, (3) therapy in the general hospital (4) complications, (5) results and disposition of patients, and (6) summary

#### TYPE AND INCIDENCE OF TRAUMATIC LESIONS

Few thoracic and abdominal organs are im mume to injury in penetrating or perforating From Surgical Service, sooth General Hospital. thoraccabdommal wounds. In this series, the adrenals and bladder are the only organs which were not injured. Table I shows the variety and incidence of the various thoraccabdominal lesions and the more serious of the concomitant lesions sustained by the patients. Only 48 5 per cent of the patients had pneumothorax, hemothorax, or bemooneumothorax. It is believed that the actual incidence was higher but the degree was so mild that the condition was not listed as a diagnosis.

#### THERAPY IN FORWARD HOSPITALS

The possibility that a bullet or shell frag ment may have perforated either the thoracle cavity or abdominal cavity or both is the problem that presents itself with each patient who sustains an injury to the chest or abdomen particularly the lower chest. It requires skillful surgical judgment in the early evalu ation of the lesions in these patients and no less skill in the proper operative treatment. In penetrating as well as perforating tangen tial wounds the surgeon must choose between an exploratory laparotomy thoracotomy thoracotomy with transdiaphragmatic abdominal exploration a separate thoracotomy and laparotomy or a simple débridement of the wound. That no one approach has found universal favor is shown by reference to Table II. One patient had a left thoracotomy, a laparotomy and a right thoracotomy at his initial operation.

X-ray films in suspected thoracoabdominal injuries may be misleading particularly if the plate is underexposed if read when wet and by an inadequate light. Under these conditions small intra abdommal foreign bodies may be overlooked. Early clinical signs may also be mild or be masked by other injuries such as brain or spinal cord lesions, burns severe fractures and similar injuries. It is to the credit of the surgeons in the forward hospitals, therefore that only 5 of the 270 pa

LESIONS		
Type of leafon	Change	Por
Thorseoubdominal Leslons		
Perforation of right disphrages	750	13 0
Perforation of left disphragm	107	58 0 39 6
Perforation of right and left diaphragm	4	ĭ, j
Perforation or laceration or both of lung.	9 8	34 0
Preumotherax, hemotherax, or		•
hemopaeumothorax	131	48 5
Retained foreign body in lung	10	37
Perforation or laceration or both of right		
lobe fiver	138	51 I
Perforation or laceration or both of left lobe liver		
Total cases of liver injury	17 155	6 3
Retained foreign body in liver	.22	57 4 4 8
Perforation or laceration or both of spicen	δĩ	ม่อ
Perforation or incernation or both of right kidney	10	70
Perforation or laceration or both of		, -
left kidney	17	6 5
Total cases lidney injury	36	13 3
Laceration renal artery	I	0.4
Perforation or laceration or both of stomach	35	13 0
Laceration of colon	32	5 6
Lecention small bowel	11	40
Laceration pancreas Laceration gall bladder	4	1 2
Lacration perfearding	*	0 7
Lacoration heart	2	1 1
	4	
Concomitant Lexions		
Compound fractures, other than ribs	41	15 6
Peripheral nerve palsy	7.5	5 6
Spinal cord intery	4	1 5
Brein injury	3 5	1 1
Amputations	2	19
Burns, second and third degree	ı	04
Laceration right common iliac vein	1	04

tients with thoracoabdominal injuries were evacuated to the base hospital without the presence of thoracoabdominal injury having been recognized and without any operation having been done These patients were evac nated during periods of extreme activity on the front at which time large numbers of casualties were flooding the field and evacuation hospitals Two of these patients were received within 24 hours after injury so the time in terval was not greatly in excess of that which would have elapsed had the patients had an operation in the forward hospitals. Two were received and operated upon 3 days after m jury Another had no immediate serious con sequence of the wound and had no operation

The variety of primary surgical procedures which were necessary is shown in Table III The records showed only 60 5 per cent of the cases in which the disphragm had been su

#### TABLE L-TYPE AND INCIDENCE OF TRAUMATIC TABLE IL-PRIMARY OPERATIONS AT FORWARD HOSPITALS

Operations	Corre	CHARL
Thoracotomy	70	38 S
Laparotomy	62	25 0
Thoracotomy with transdisphragmatic		•
abdominal exploration	59	25 8
Debridement of wounds, only procedure	20	11 7
Laparotomy and thoracotomy	23	93
No surgery	5	3 0
Total	148	100 0
(No record available as to type of operation)	11	
Total	270	

tured. In only I case however was mention made that the diaphragm was not sutured Similarly only 97 per cent of the cases were reported to have closed intercostal catheter drainage of the pleural cavity following initial operation Only one half of the total number of patients having a wound of the liver had postoperative subcostal drainage of the liver or the subphrenic space

Practically all of the patients received transfusions and plasma before and after the initial operation as well as sulfonamide penicillin or both. Records were not available as to the duration of therapy with these drugs. Sulfadiazine was the sulfonamide usually given and was administered in doses of 1 gram every 4 hours Penicillin was given in the dosage of 25 000 units every 3 hours

#### THERAPY IN THE CENERAL HOSPITAL

For the entire group of cases the average time after injury until admission to this hospatal was 18 o days. The longest time interval was 120 days the shortest I day

It is interesting and very important to note that 41 per cent of the patients required no further operation at the base hospital. This does not mean that the patients did not re quire further therapy. On the contrary many of the patients required a great deal of atten tion such as frequent thoracentesis blood and plasma transfusions dressing of wounds and colostomies and changing of casts. The most frequent surgical procedure was wound closure A total of 98 patients 36 3 per cent had sec ondary closure or secondary closures plus akin grafts. Thoracotomy for empyema was per formed in 30 cases if I per cent This pro-

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# TABLE III.—PRIMARY SURGICAL PROCEDURES PERFORMED AT FORWARD HOSPITALS

Regical procedure	Cases	Pe
Suture of disphragm		60
Drainage of liver subcostal.	150	18
Packing of liver gauze	45	
Total cases with subphrenic or liver drainage	34	9
Suture of liver	69	¥7
Packing of fiver with muscle	7	*
Splenectomy	4	Ī
Transdaphragmatic approach		_
Abdominal approach	33	3
Total spienectomies	۰	4
Packing spleen with muscle	43	17
Suture stomach	8e	۰
Colortomy		ī
Suture small bowel	14	5
Resection small bowel, partial	4	1
Nephrectonies.		۰
Right:		
7 Abdominal approach	3	I
<ol> <li>Transdisphragmatic approach</li> </ol>	1	۰
3. Renal approach.	0	
Left		
z. Abdominal approach		۰
<ol> <li>Transdlaphrasmatic approach</li> </ol>	6	
g. Renal approach	۰	
Total rephrectomics	3	5
Drainage of kidney	ž	ŏ
Suture of kidney	,	0
Suprapuble cynfostomy	,	۰
Ligation right common illac vein	1	0
Suture of heart	1	0
Suture of lung		8
Intercostal catheter drainage	24	ō
Partial lobectomy	- 1	ó
Laminectomy		0

cedure usually consisted of a resection of a few inches of rib under local anesthesia and institution of closed drainage. A decortication of the lung was done in 3 cases for chronic empyema and also in 2 cases for organizing clotted hemothorax. An attempt was made to perform decortication of the lung in another case with chronic empyema but without success. There was an exploration of the subphrenic space in 14 patients 5 2 per cent and 11 of these had a subphrenic abscess which was drained. Table V shows the other procedures performed at this hospital.

Of the 5 patients admitted without previous operation 4 had primary debridement and operation as follows (r) thoracombouninal exploration splenectomy suture of the dia pluragm debridement of wounds (2) abdominal exploration, splenectomy suture of diaphragm debridement of wounds (3) abdominal exploration, suture of jejinum su

TABLE IV -- SECONDARY SURGICAL PROCEDURES
AT FORWARD EVACUATION OR GENERAL

HOSPITALS		
Operations	Camp	Per
Secondary closure of wounds Decortication	17	6 9
For empyems	5	30
Organizing hemotherax. Total decortications	ŧ	, '
Thoracotomy for empyema	7	18
Drainage for subphrenic abscess Secondary closure of disrupted abdominal	6	• 4
wound	1	4
Secondary thoracoabdominal exploration	1	-4
Closure of colortomy	1	04
Phlebotomy Egation of femoral vein	1	4

# TABLE V —SURGICAL PROCEDURES REQUIRED AT THE BASE HOSPITAL

Surgical procedure	C	7=
Initial, primary operation		
No further surgery required.	112	1 4
Secondary closure of wounds		43 0
Secondary closure with skin grafting	85	4 1
Thoracotomy for empyema	13	4 8
Thoracotomy for removal of foreign body	30	
Theretology for removal or foreign body		. 7
Thoracotomy suture dusphragm, packing liver	T 1	0 4
Repair disphragmatic herris	1	0 4
Intercental thoracotomy for tension		
porumothorax	1	-4
Decartication		
Empyema	3	11
Organized hemotherax	,	- 7
Attempted decortication	1	-4
Bronchoscopy for telectasis	1	04
Exploratory laparotomy	5	1 9
Drainage or exploration or both, of		
subphrenic space	14	5 2
Drainage of liver abscess	I	4
Drainage of pelvic abacess	3	
Closure of gastric fistula		04
Closure of colortomy	1.2	4.4
Nephrectomy	τ	9.4
Removal of foreign body from eye	1	04
Amputation	1	4
Orthopedic procedures skeletal traction, etc.	5	19
Drainage brain abscess	-	4

ture of diaphragm, colostomy débridement of wounds (4) débridement of wounds only

#### COMPLICATIONS

Seven patients in this series died which is a mortality rate of 2 6 per cent. A brief sum many of these cases follows

CARE : A white male, aged as years, was adtified 38 days after injury, in which be entatined a penetrating wound of the left thorar, with laceration of pleura, disphragm stomach, and spicen. He developed empyema of the left pleural space and an embolic hemolytic staphylococcus brain abscess and died q days after admission, 47 days after injury

CASE 2 A colored male, aged 25 years was shot one day before admission to this hospital. He had a sucking wound of the right lower chest which was debrided and closed at a nearby station hospital. He was transferred to this hospital because of evi dence of continued intrathoracic hemorrhage the day of admission to this hospital a thoracotomy was performed through the right eighth intercostal space, the liver was packed and drained subcostally the diaphragm was closed a bleeder in the pericar dual fat was ligated a laceration of the lung was sutured intercostal underwater catheter drainage of the chest was established and following bronchoscopy, the patient returned to the ward in good condition. He had a sudden cessation of resoiration approximately 30 minutes after returning to the ward and expired. No cause was found for his death.

Case 3 A white male, aged 23 years, was admit ted to days after his original injuries which consisted of a penetrating wound of the right thorax with a laceration of the lung diaphragm, and liver He also had a wound of the right hand with a fracture of the second metacarpal. At a forward hospital the pri many treatment consisted of a thoracotomy with removal of the foreign body from the liver A muscle transplant was placed in the liver laceration and the diaphraem was sutured. The pleural cavity was drained by catheter postoperatively. The patient ran high fever after admission to this hospital and expectorated bile-stained sputum and vomited bile several times. He was thought to have a subhepatic abscess and operation for drainage was to be per formed, but he died shortly after the anesthetic was started. Death occurred 10 days after injury At autopsy he was found to have subphrenic and subhepatic abscesses as well as an abscess of the liver and a peritoneophrenicobronchial fistula. He also had a massive retroperitoneal hematoms, the cause of which was undetermined a bronchopneumonia of the right lower lobe of the lung and dilatation of the right side of the heart.

Care 4. A lieutemant, 34 years of age, was admitted at days after injury. He sustained multiple penetration wounds of the right sternal region with penetration of the right lobe of the liver wounds of the left acaip left arm, right thigh, and left shoulder. At forward hospitals he had had a débridement of his wounds, an exploratory laparotomy and several days later drainage of a sulphrenic abscess. At this hospital he had a secondary closure of his wounds and an exploratory laparotomy 45 days after injury with drainage of the subphrenic space. He devel oped multiple billary fatules of the abdominal wall and after a long very stormy course finally expired 45 days after admission, 66 days after injury

The principal autopsy findings were multiple liter abscurses subphrenic and subhepatic abscurses, beterienia due to Acrobacter aerogenes periodits, acute bile nephrosis cholangitis, acute trappents, right bronchopneumonia, left dilatation

of the heart, severe atelectasis of the right lower lobe of the lung hyperplasis of the bone forming elements of the bone marrow

CASE 5 A white male, aged 27 years, was admit ted to this hospital so days after injury. He sustained a penetrating wound of the lower right chest with penetration of the right pleural cavity dia phragm, and a laceration of the right lobe of the liver The day following injury at a forward field hospital he had an exploratory lanarotomy. A large wound of the liver was found and packed for a period of 10 days, after which the packing was re moved Shortly after the operation, the patient developed ascites and pitting edema of the ankles He complained of an uncomfortable full feeling in his abdomen and anorexia. Examination on admission to this hospital revealed signs of free fluid in the abdomen with edema of the ankles and toes There was no evidence of collateral circulation. The liver was not palpable. X ray examination of the chest showed some elevation of the left disphragm. The patient ran a temperature in the vicinity of oo.4 de grees during his stay in the hospital. Six days after admission he was given a cubic centimeters of sal yrgan and had a marked reduction in the size of the abdomen and moderate diminution of the edema of the feet. Seventeen days after admission the patient walked to the latrine, and while having an anner ently normal bowel movement, suddenly developed weakness air hunger and evanosis, and expired anproximately 20 minutes later Essential autopsy findings were a massive subphrenic abscess, chronic, right, with terminal rupture into the peritoneal cavity peritonitis, acute, diffuse, sovere terminal atelectasis of lung bilateral, due to compression cardiac dilatation marked right,

CASE 6 A white male, aged 23 years, was admit ted to this hospital 17 days after injury. He had received a penetrating wound of the left thorax just below the nipple. The shell fragment passed through the pleural space lacerated the apex of the pericar dlum, perforated the diaphragm and lodged in the right lobe of the liver Primary operation consisted of a laparotomy with suture of the diaphragm. The liver faceration was noted but there was no active bleeding. The foreign body was not removed. The chest wound was debrided and one suture was taken in the pericardium and the wound was closed Four days after injury he began having chills and fever and was diagnosed as having malaria, though smears were negative. He was not acutely ill, and his con dition was fairly good on admission. Shortly after admission, he began having almost daily chills and fever of 103 104 5 degrees F Repeated malarial smears were negative. The patient became faun diced and it was felt that he probably had a subphrenic abscess or a liver abscess or both. Two blood cultures were positive for Escherichia coll and two were negative. He did not improve with peni cillin given in doses of 25 000 units every 3 hours or to heavy doses of sulfadiasine. Forty days after in jury a first stage operation for exploration of the

#### TABLE VL -- COMPLICATIONS

TABLE AL-COMPLICATIONS		
	C===	Per cest
Died	7	26
No thoraconbdominal complications	172	63 7
Chest complications		-5 /
Empyema	43	15 9
Bronchopleural fatula	4	ĭ 4
Hemotherax, clotted, organizing	•	οź
Atelectasis	4	4
Persistent large empyema cavity		04
Tension preumothersx		•
Unilateral		0 4
Bilateral	1	04
Pleural effusion	I	0 4
Atypical r pneumonia		ź
Bronchopneumonia		0 4
Pulmonary embolism, fatal		04
Pulmonary infarction	2	٥ż
Pericarditis, acrite fibrinous		0 4
Abscess of thorsectomy wound		0 7
Abdominal complications		-
Subphrenic abocess		
Following previous subphrenic drainage	9	3 3
No previous drainage	8	30
Total subphrenic abscess	17	30
Liver abscess	3	1
Subbepatic abserm		04
Bile peritoritis		0 7
Pelvic abacess	3	ī
Intestinal obstruction		
From adhesions		04
Beus	3	0 7
Abdominal biliary firtula	4	14
Billary and urinary fistula		04
Gastric fistula	_	04
Hepatitis with faundice	8	30
Spontaneous extrusion of gall bladder		04
Hematuria, cause undetermined.	I	04
Albumburia, cause undetermined		0 4
Hydronephrods		04
Thoracouldoninal complications	_	
Phrenicopleurocutaneous fistula	8	30
Peritoneophrenicobronchial fistula		04
Diaphragmath: hernia		0 4
Miscellaneous complications		
Embolic brain abscess		4
Air emboliam, cerebral, nonfatal		0.4
Septicemia, clostridial		0.4

nght subphrenic space was done and the second stage to days later bot no pear was found in the subphrenic space for was any pus obtained with suphrance and the subphrenic space for was any pus obtained with suphrance meantitles of blood and plasma, the patient's blood cells, hemoglobin and serum protein resulted low and he developed peripheral edems. This improved with the administration of human serum albumin daily in 100 cubic centimeter doses for 5 days, but the constant septiemia gradually debill tated the patient and he finally capitred 50 days after admission, 67 days after injury. Yutopy revealed a small metallic foreign body in the right lobe of the liver which was lying parity within the humen of a fairly large branch of the hepatic v i There was a very small abscess cavity about the foreign body as very small abscess cavity about the foreign body

Malaria, recurrent

Thrombonhiebitis

and some abscess formation had occurred along the missile tract and had apparently recently ruptured into the abdominal cavity Microsophully the liver showed numerous minute abscesses.

CASE 7 A white male, aged 30 years, was admit ted 9 days after having sustained a gunshot wound of the right shoulder which passed through the right thoracic cavity lacerating the diaphragm and liver, He also had a wound of the right hip with an incomplete fracture of the greater trochanter of the femor Original treatment consisted of dibridement and auture of the thoracic wound, a laparotomy and reture of the disphragm with subcostal dramage of the subphrenic space. Four days after admission be developed a tension pneumothorax on the right and the following day on the left and in spite of bilateral intercostal thoracotomies with catheter drainage the patient expired 5 days after admission, 14 days after injury Autopsy findings were atelectasis, bilateral, marked hydropneumothorax, right, moderate car diac dilatation, marked abscess, subdisphragmatic, right congestion of viscers, marked and extremity wounds as described above.

Table VI shows that the most frequent complication was empyema. There were 43 cases of empyems, an incidence of 15.0 per cent of the 270 cases reviewed. There was only I case of empyema which did not have a perforation or laceration of some thoracic or abdominal organ. Of the 43 cases of empyema only 2 4.9 per cent were able to return to limited duty. The others were evacuated to the Zone of Interior for further convalence. In only one case was there a large persistent empyems cavity present when the patient was evacuated. The average number of days after injury until thoracotomy for empyema was done was 26 6 Only 2 cases of clotted, organ izing hemothorax resulted from a total of 131 cases in which a diagnosis of hemotherax or hemopneumothorax was made. In the ma jority of the cases repeated thoracenteses were done and these were sufficient to cure the he mothorax entirely. It is interesting that clinically only 4 cases 1.4 per cent had atelectasts. This low incidence is probably due to the frequency of bronchoscopy following thoracic and thoracoabdominal operations. were 17 cases, 63 per cent who developed a subphrenic abscess, though the incidence in those cases with previous drainage and without previous drainage at the initial operation was practically the same However, those patients who had subcostal drainage in liver injuries seemed to do better clinically than

TABLE VII - DISPOSITION OF PATIENTS

Disposition	No.	Per		daya AJ w selos tim ko	gati) Na. daya hospitalization hospital at this hospital		No. days A.I. until disposition				
	Chies	COOK.1	Longest	Shortest	Average	Longest	Shortest	Average	Longest	Shortest	Average
Zane baterior	10	25 5	119		3 9	1.8	5	45 5	,	•	77 5
[ limited duty	11:	30.4	,		16	UI	8	58 3	ar.	=7	74 6
Pall daty	74	80	24		1,	,	#O	48 5	1		64
Evacuated to North Africa	,	2.6			17 0	100			et.	,	27
Died	1	1.6	13		7.0	80	1	3.6	13		4 4
Total-	-170	100				A.LA	Iter Intery				

Total-ero

did those who had no drainage. There was a remarkable absence of generalized peritonitis and a low incidence of localized abscess forma tion in the abdominal cavity. It is believed that early operation and postoperative treat ment with penicillin or a sulfonamide or both in these cases are largely responsible for the low incidence of injection and abdominal complications in general Only 3 cases 1 t per cent, had a diagnosis of intestinal obstruc tion made and 2 of these were from paralytic lleus. Four cases, 1 4 per cent, had abdominal biliary fistula and one had a combined biliary and urinary fistula of the right flank. The patient with biliary fistula and with hepaticophrenicopleural fistula were in general the sickest patients and required more and closer attention and care than did any others of the group Eight patients, 3 per cent, developed hepatitis with jaundice. It was not deter mined if this were secondary to the liver in jury or if the patient developed the infectious hepatitis which was prevalent in the theater at this time Acute thrombophlebitis devel oped in 3 patients, 1 r per cent. One patient had a phlebotomy and ligation of his femoral vein. There was no record of therapy on the other two

#### RESULTS AND DISPOSITION OF PATIENTS

Table VII shows that 8 9 per cent of the pa tients were able to return to full combat duty an average of 60 days after injury

An example of this class was the case of a 25 year old white male who was admitted to this hospital 8 days after receiving a penetrating wound of the right thorax with laceration of the diaphragm and liver He had a thoracotomy after partial resection of the seventh and eighth ribs, and the disphragm was su tured. He had an exploratory laparotomy but no visceral damage was found except a laceration of the liver, which was packed The only therapy at this hospital was repeated thoracenteses for the hemothorax on the right. The patient was dismissed to full duty 41 days after admission or 40 days after injury

There were 82 patients 30.4 per cent who were returned to limited duty in this theater

An example of this class was the 20 year old white male who was admitted to this hospital II days after receiving a penetrating shell fragment wound of the left chest. His injury consisted of a sucking chest wound, a compound fracture of the left ninth rib a laceration of the left dusphragm left kidney and spleen. Treatment at a forward hospital consisted of a thoracotomy with transdisphragmatic abdom inal exploration splenectomy, and drainage of the left perirenal space through a flank wound. The dia phragm was sutured and the thoracotomy wound closed. Postoperatively he had a hemothorax of the left pleural space. The only treatment required at this hospital was thoracenteses to remove the hemothorax. His convalescence was uncomplicated and he was dismissed to limited duty 55 days after ad mission, 66 days after injury

Over one half the patients, 55 5 per cent in this senes were evacuated to the Zone of Interior for further convalescence Many of these patients, however were evacuated be cause of concomitant lesions and not directly due to the thoracoabdominal injury or its complication (see Table I)

An example of a patient with a thoracoabdominal complication was the 25 year old white male who sustained a gunshot wound of the right thorax with a laceration of the lung diaphragm, and hver Primary treatment consisted in debridement and clo-sure of the sucking chest wound Thoracenteses were performed postoperatively and 12 days after injury at a forward general hospital he had inter

costal catheter drainage of the right chest because of bile stained pus in the right pleural cavity Twenty four days after injury he had a decortication of the right lung and a closure of a bronchial fistule, and the wound in the diaphragm was closed. Thirty-six days after injury he had a thoracotomy for drainage of a recurrent empyema, and this procedure was repeated 44 days after intury. The patient was transferred to this hospital 66 days after injury and several days later inclaion and drainage of a subphrenic abscess were done. On the 70th day from the onset of his illness, another exploratory thora cotomy was done with the purpose of doing another decortication because of a persistent, large empyema cavity It was found to be impossible to decorticate the lung, so the patient was evacuated to the Zone of the Interior 125 days after injury with a large re sidual empyema cavity This was the only patient in the entire series who will probably have a consider able degree of permanent disability as a result of his thorseoabdominal wound

Seven patients in this series who died have been discussed above

Seven of the patients were evacuated to North Africa and their final disposition is not known

In the majority of the patients evacuated to the Zone of the Interior their wounds and colostomy if present, were closed and healed. It is believed that only an extremely amail percentage of these patients would require future surgery as a result of their thoracoabdominal wound and that the permanent disability therefrom should be practically nil.

#### SUMMARY

The incidence of thoracoabdominal injury was I per cent of all admissions to this hospital

and 1 9 per cent of all battle casualties and m juries admitted.

A wide variety of lessons resulted from thor acoubdominal wounds but the principal or gans involved were the liver 57.4 per cent the lung 34 per cent the spicen 23 per cent

kidneys 13 3 percent the stomach, 13 percent.

The patients were operated upon by a number of different surgeons, who used a variety of approaches, and no one operative procedure has found unusual favor over another

The average time after injury until the patents were received at this hospital wadays. After arrival only 43 per cent refurther operation which consisted print of secondary closure of wounds with or out skin grafting in 363 per cent of thoracotomy for empyems in 11 x per exploration of the subphrenic region in cent colostomy closure in 4.4 per cent decortications or 1.8 per cent 3 for em and 2 for organizing hemothorax.

The mortality rate was 2 6 per cent series of cases. Complications were relieve with empyema occurring in 1.50 pe of cases and subphrenic abscesses deve. In 6 3 per cent. In occase transdisphragia abdominopleurobiliary fistulas devel There were no thoracoabdominal com tions in 6.3 per cent of the cases.

There were 24 patients who were all return to full duty and 82 who returned t ited duty a total of 39 3 per cent of it itents who were of further service to the in this Theatre of Operations.

### DECORTICATION IN ACUTE EMPYEMA THORACIS

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HE radical management of empyema thoracis in the acute and subacute phases is an attempt to eliminate chronic empyema. That there is a place for pulmonary decortication in certain cases of acute empyema is now well established. It is the purpose of this paper to discuss briefly the problem and then to present case reports which may be of value in establishing the proper indications for radical or

conservative therapy

Decortication was first practiced in this the ater in cases of massive clotted hemothorax.1 Four weeks after wounding now is considered to be the optimum time for its performance in uninfected cases. Later the same operative procedure was adopted in the management of infections in clotted hemothoraces. In these cases the operation is performed as soon as the presence of injection is established. A few have extended the use of this procedure to the man agement of the more severe infections in both post traumatic and postpneumonic empyema. Some have attempted to differentiate infected hemothorax and empyema in discussing post traumatic infections within the pleura. How ever the dividing line is not clear. Without proper therapy the infected clotted hemothorax may result in a most disabling chronic empyema. With radical surgical attack the illness in acute severe post traumatic or post pneumonic empyema may be shortened to a few weeks. Infected hemothorax properly may be called empyema.

The writer has formed the following opin ions (a) Closed or open drainage (thoracostomy) is the procedure of choice in small and moderate sized, unilocular post traumatic or postspoeumonic empyema. (b) Thoracotomy with evacuation of the pleura and decortication of the lung is the procedure of choice in multilocular empyema and in total empyema with collarse of the upper lobe. In this group with collarse of the upper lobe.

fall both post traumatic and postpineumonic infections, including those which develop in large clotted hemothoraces

The technique of pulmonary decortication has been described by Burford and Samson Essentially the same technique has been used in the cases which form the basis of this report Certain points should be emphasized Intratracheal gas-oxygen-ether is the anes thesia of choice (b) Prior to operation a can nula should be placed in an ankle vein through which blood may be administered as indicated throughout the operation (c) Posterolateral thoracotomy with or without rib resection is the preferred approach (Fig. 1) (d) All free fluid and clot are removed from the pleural cavity (e) The fibrinous membrane-like en velop which encases the lung must be com pletely extrepated. An attempt is made to develop a cleavage plane between the pleura and this organizing exudate (Figs 2 and 3) In some cases this is easily accomplished in others it may be most difficult or impossible. In em pyema the fibrinous membrane may be much more densely adherent to the pleura than in uncomplicated clotted hemotherax. It is un desirable to traumatize or remove the visceral pleura but occasionally this is inadvertently done. The resulting air leaks may be plugged with fibrin foam but if this is not completely successful, the multiple catheters which are routinely used, maintain expansion of the lung until the small fistulas are occluded. The fibranous membrane should be removed from all parts of the visceral pleurs including that in the fissures so that complete re-expansion is possible (Fig 4) (f) It is not necessary to remove the exudate which is densely adherent to the parietal or diaphragmatic pleura (g) It is well to test for au leaks with physiological salt solution after re-expansion of the lung prior to closure (h) Large mushroom cath eters, size 28 to 34, are placed in the 2d inter space middlevicular line in the 8th interspace at the posterior smilary line and in the costophrenic sulcus in the anterior axillary line

Chinesa, Paul C., Burford, Thomas H., Brewer Lyman A., III., and Berbank, Benjamin. The management of war wounds of the chear in a base center. J. Thorac. Surg. (In press)

These are all connected to separate water-sealed bottles which are placed at least 18 inches below the level of the catheter (f). Intercostal nerve block with 1 per cent novocain is rout tinely done at the conclusion of the operation (j). Penicillin 100,000 units in 50 cubus centimeters of physiological salt solution is instilled into the pleura just prior to closure. The posterior catheter is left clamped for a period of 4 hours. (k) Penicillin is given intramuscularly 25 000 units every 3 hours for a minimum period of 24 hours prior to operation and is continued postoperatively as long as indicated.

Penicillin has been given credit for the suc cess of this radical surgery in empyems. It has, at least given the surgeon courage to proceed in the presence of severe infection. Its importance however may have been overrated. It is interesting to note that in one case to be described no penicilin therapy was used. In several other cases gram negative bacilli were the offending organisms. The mechanical factors probably are of much more importance than is chemotherapy Removal of clot fluid, and fibrinous exudate eliminates most of the culture media for the organisms present. Multiple empyema cavities are converted into one This cavity is largely obliterated immediately by the re-expansion of the incarcerated lung

In the author's limited experience with de cortication in the management of acute em pyema, there have been no fatalities. The cases presented below are representative of the more severe types of infection.

Case r. An infantryman was admitted to an evacuation bospital y bours after sustaining multiple wounds from a rifle bullet with perforating wound of the right chest; bilateral hemopneumothorar, rigid abdomen, and paralysis of both lower extremities.

The patient was resuscitated and stabilized before athoracotomy was periormed. At thoracotomy there were revealed intercostal bleeding and perforation of the left disphinging as well as two holes in the stomach. The openings in the stomach were closed, the disphinging was approximated with interrupted slik sutures, then the left chest was closed without drainage. The sucking wound of the right chest was simply débrided and closed. A suprapuble cyatestomy was done at this time.

He remained in a critical condition for several days afterward, in a posterior shell with a suprapulor eathern be was evacuated to a general lospital. Admission note recorded His condition was fair with complete motor loss of both lower extremi

ties, as well as loss of sense of touch, pain and post tion." The patient was moderately dyspocic with signs (initial x-ray films are not available) of fluid at his right base, but aspiration withdrew only 150 cubic centimeters of thin, turbid exudate, which by culturing grew gram negative bacilli. Y-ray examination disclosed a bullet lying in the spinal canel at the level of the 1st lumber vertebra. Emergency laminectomy 12 hours after admission, was per formed and the cord was found irreparably damaged The bullet was removed. The admission tempera ture was 103.8 degrees F Postlaminectomy temperature for 10 days ranged from 102 to 104 degrees F Repeated chest taps on the right obtained only small amounts of foul smelling fluid. X-ray pictures then showed fluid and thickness over the pleura virtually obliterating the right lung shadow

In view of the fact that the urine was negative and the wounds relatively cleen, it was obvious that the pyrexia was all due to the empyema. A catheter was placed in the 6th interspace, posteriorly but drained

only a small amount of thick, foul pus.

Fliteen days after admission thoracotomy with decortication was done even in the face of a tempera ture of 104 degrees F The thoracic cavity was entered through a posterolateral incision in the 4th interspace. Multiloculated pockets of gelatinous purulent exudate were found The lung was collapsed and adherent in the posterior gutter area. A thick organized membrane varying from 1 to 4 centimeters in thickness covered the entire visceral and panetal pleurs—this served to obliterate the hing in a col lapsed position. The adherent capsule-like sheet was extirpated from the visceral pleura with careful blunt and sharp dissection. Bleeding was quite profuse. It was surprising to note that there was a definitely established vascularity between this fibrinous layer and the visceral pleurs. At several sites the visceral pleura was torn-attempts were made to close the pleural rents but a small amount of air continued to leak after the lung was inflated, for which reason two anterior as well as one posterior catheters were used. At completion of the operation the lung was re-ex panded to so per cent of its normal extent. The patient was in very poor condition blood pressure had fallen perceptibly and only by forcing blood, coramine, and artificial respiration was he resuscitated.

During the operation this patient received 1500 cubic centimeters of blood 500 cubic centimeters of plasma, and 500 cubic centimeters of saline. He was in fair condition on return to the ward. Oxygen was continued and the tubes were connected to water seal bottles.

The postoperative course was suprisingly unevert full in view of his critical proporative condition (complete transection of his spinal cord). The anterior cathetens were removed in 7 days as the long appeared to be sufficiently out and adherent—the posterior catheter was removed 12 days postoperatively. Chest aspiration was necessary on 3 later occusion. Proporatively and postoperatively this patient was

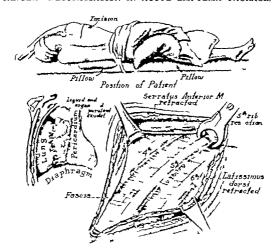


Fig 1 Technique employed in performing thoracotomy with rib resection. An intercostal approach is optional. Cross section is of chest with total multiloculated emperms and collapse of the lung

given large quantities of penicillin as well as sulfa thusple.

Unfortunately, a postoperative x ray film is not obtainable. At the time of his evacuation to the rear a weeks after decortleation the x ray report reads. Absence of former density and complete expansion of the upper lobe however the diaphragm remains elevated. Nine weeks after decortication the following letter was obtained from the rear hospital to which the patient had been evacuated. At this time his condution relative to pulmonary status is excellent. There is minimal thickening of the chest in the right anterior base. The right lung appears fully expanded. The soldier is afebrile with no complaints of his chest or breathing. As you might judge there has been no change in his paralysis.

Any patient that is so physically handicapped with a complete transection of the cord so extremely toxic with a temperature of 105 de grees F and without the will to live is the worst imaginable operative risk. Ordinarily

Some of these patients were operated upon t base hospital while I as there on temporary duty. Consequently many -ray partures tree reacented with the patients prior t the accumulation of the material for the paper.

one would defer from proceeding with a haz ardous operation but in this incident such an undertaking offered his only chance of survival. The results amply justified this risk

CASE 2 This American soldier was wounded by a shell fragment which produced a perforating wound of the left chest. He lay in an Italian bospital unattended 4 days prior to admission to an evacuation bospital accutely ill with grossly infected superficial wounds and empyema. Treatment was supportive with repeated chest aspirations. Hemolytic streptococci were cultured from the fluid aspirated

Three days later the patient was transferred to a general bespital. He was in fair condition dyspiner, temperature ros degrees F with signs and symptoms (Fig. 5a) of pocketed fluid and thickened pleurs in the entire left chest area. He coughed continuously producing copious quantities of white frothy sputtum without odor. Four hundred cubic centimeters of brownish foul fluid was appirated from the 7th interspace in the posterior axilliary line at which site a No. 24 French extheter was placed through a trocar—specimens taken produced a growth of hemolytic streptococca and gram negative becilio in culture. The

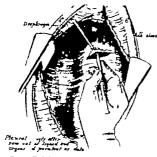


Fig 2 Technique employed in developing cleavage plane between the organizing crudate and the visceral pleura.

temperature remained elevated to 103 degrees F even though the catheter drained satisfactorily Further aspiration revealed localized cavities in the anterior and midazillary areas for which reason (multiloru lated empyerma) it was deemed whe to proceed with thoracotomy and decortication. In the interim the patient was supported by several transfusions during

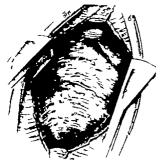


Fig. 4 Lung completely freed and inflated. Re-expangion of the lung following extirpation of the constricting capsule.

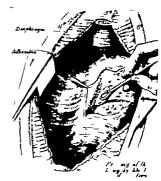


Fig. 3. Method used in removing the densely adherent membrane from the compressed lung.

a period of 7 days. The first 4 days after admission the soldier was given 3 000 units 1 penicillia every 3 hours then by some mainterpretation of orders, the drug was discontinued and it was never refosiltuted.

At operation under intratracheal gas-oxygen-ether anesthesia, through a posterolateral incision with resection of a 2 centimeter section of the 7th rib the pleural cavity was found to be filled with organiz ing clots of purulent exudate with multiple empyeme pockets. The entire lung was collapsed against the mediastinum and enveloped by a thick 4 millimeter tough and very adherent membrane. A clean line of cleavage could not be identified but by slow and tedious sharp and gauze desection, the greater thickness of this restricting sheet was stripped from the visceral pleura, although a thin membrane was too adherent to be separated except by removing small segments with the visceral pleura. However 00 per cent re-expansion was obtained afte inflating the lung with 8 millimeters of positive pressure. A No 26 catheter was placed in the 2d interspace anteriorly and a No 32 catheter in the 7th interspace in the posterior axillary line. Before closing in layers with interrupted silk sutures, an intercostal nerve block with novocain was effected of the 3d, 4th, 5th, 6th and 7th nerves.

Prior to the operation blood was started in the right ankle and the left arm 1000 cubic centimeters, 500 cubic centimeters of plasma and 500 cubic centimeters of 5 per cent glucose were given d ring the operation. Bronchoscopic aspiration was thought unoceerastry postoperatively as the bronchal system was



Fig. 5. a, The areas of increased density proved to be multiple pockets of empyema. The entire lung field is further obscured by organizing fibrinous exudate | b | Re-expansion

of hing after decortication. The shadow along periphers, usually termed thickened pleura, actually is an organized membrane over parietal pleura that need not be extirpated.

relatively dry having been successfully aspirated by a long tracheal catheter

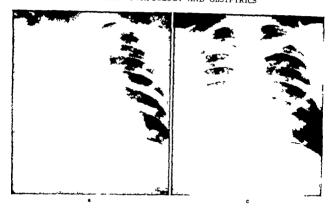
The postoperative course was without mishap Both catheters were removed within 16 days without further pocketing or the necessity of aspiration Twenty-eight days after operation an x-ray film (Fig. 5b) showed satisfactor: re-expansion of the lung Patient was discharged to class B duty<sup>1</sup> 42 days after operation.

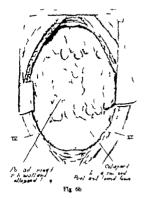
We assumed we were protected by penicillin but inadvertently this patient did not receive any penicillin 4 days prior to the operation or any afterward This case represents supportive evidence that the operation is physiologically sound Irrespective as to whether penicillin has any specificity against the infecting organism we recommend the continuance of its use

CAE 3 This infantryman was wounded by small arms fire austaining a penetrating wound of his right chest. Seven hours after injury a thoracotomy was done in a forward hospital. The right diaphragm was found to have been perforated and the dome of the liver was lacerated. No attempt was made to sature the liver but subdiaphragmatic drainage was effected through a subcostal flank incision. The diaphragm was closed then the pleural cavity was closed without drainage.

Claw & duty includes any type of du y except combat

The patient was admitted to a general hospital 8 days afterward dyspneic, slightly cyanotic, with a temperature of 102 8 degrees I and signs and symptoms of fluid in the right chest. After aspiration a tube was placed in the 6th interspace in the posterior axillary line there was obtained foul smelling bile stained exudate from which gram negative bacilli were cultured There was also drainage of a similar character from the subdiaphragmatic stab wound \ ray ex amination (Fig. 6a) showed the diaphragm to be fixed and elevated Temperature elevation continued Peni cillin and sulfathiazole were used interchangeably and together for a period of 10 days. The lung was completely collapsed and another fluid level was detected about the drainage tube. For that reason 8 days after admission thoracotomy and decortical tion were done with resection of the 5th rib in the posterior axillary line. The chest cavity was filled with (Fig 6b) yellow, blle stained foul smelling ex udate intermixed with flaky partly organized fibri nous masses of pus The lung was compressed into a small area in the posterior gutter area. The mem brane which was removed from the visceral pleura with difficulty measured 2 to 5 centimeters in thick ness. Oozing from the pleural surface was consider able. Transfusions of 1300 culne centimeters of blood and 1000 cubic centimeters of pla ma were neces ary to sustain the patient blood pres ure to 90/60 throughout the operation Numerou leak in th lung were detected after its reinflation. These were closed with interrupted silk sutures, but to compen





sate for any unrecognized leakage, two catheters were placed anteriorly one in the 3d interspace in the midelavicular line, one in the 4th interspace in the

Fig. b. a, The displarage is markedly elevated and the remainder of the right lung field is greatly obscured by perand organized bemechanz. b Ble stained, partly organized, purelist tendent correcting the numbrane Ris capsule, which is compressible kings to the posterior getter. C is veries after operation, above antifactory re-cognition of displarage remains elevated. This, remainly has no learing on the convolucement of this type of case.

anternor lune, and also one in the 1th interspace in the posterior arillary line. Bronchascopic amparition was performed postoperatively for excessive tensions touchial secretion. Grygen was started as he returned to the ward. It should be noted that a communication through the daphersum's centimeters in diameter in the anterior medial area, could be felt, but it was thought the surrounding tissue would not lead itself to plastic repair. A large exterior was placed in the subcostal sinus beneath the diaphersum this sho was connected to a water-seal juy. It was interesting to observe respiratory motion of the water column from this other.

Six weeks after operation x ray (Fig. 6c) shows that the diaphragm remains elevated and adherent laterally Flity three days after decordination the patient was symptomless and was discharged to class B duty

The infecting organism was a gram negative becillus. Theoretically penicillin is ineffective against such bacteria. Sulfathiande was also given though we fully realized drugs of the sulfa derivation cannot effect bacteria in the presence of pus. More for luck and for lack of courage not to give them both were used However, we believe they played no rôle in the recovery of this patient. True enough the diaphragm did remain elevated and a lateral shadow was apparent when the patient was discharged All of which is accountable be cause of not decorticating the diaphragmatic and parietal pleura To decorticate the parietal pleura is totally unnecessary. As for decorticating the diaphragm the objections are (a) it prolongs the operation on a seriously ill patient (b) the surface oozed more freely than does the visceral pleura (c) all patients with postoperative high fixed diaphragms seem ingly get well satisfactorily soon without this added procedure

CASE 4 The patient was wounded in action by a shell fragment 7 hours before admission to an evacu ation hospital He had multiple wounds of his arms right thorax, and abdomen Resuscitation was ade quately carried out prior to débriding the wounds following which an exploratory thoracotomy was per formed and then a laparotomy Through a right thoracotomy approach the diaphragm was repaired Laparotomy was performed through a separate in cision (intra-abdominal viscera were found to be in tact) The foreign body was removed from the right retroperatoneal tissue. He was evacuated to a gen eral hospital 2 days later in fair condition. According to the admission note there was considerable subcutaneous emphysema in the right thoracic and upper abdominal regions Aspiration of the chest revealed 350 cubic centimeters purulent odorous fluid which was tinged with blood and 200 cubic centimeters of I ray examination (Fig 7) showed the lung 75 per cent collapsed surrounded by a shadow which was thought to be organizing hemothorax, and also an elevation of the right diaphragm. Repeated aspirations were carried out although only a small amount of thick exudate was obtained. A subdisphragmatic abscess was found and drained through the bed of the resected 12th rib However this did not alleviate the temperature elevation and symptoms of toxicity

Two weeks afterward a decortication was done and too cubic centimeters of thick doorous enudate was removed. There was found multiloculated emprema rather compartmented in balls of pus. The entire upper lobe was held fast and further compressed by a thick capsule. The fibrinous layer on the viscral pleural was stripped away. Bleeding was free Unfortunately the pleura was torn in the removal of this capsule. Three catheters were used after operation to drain the air and the resultant exudate. Intercostal nerves were blocked interporty. The wound was then closed with interrupted sutures of



Fig. 7 Partial collapse of the right lung from what proved to be a multiloculated empyems overlying a thick fibranous membrane. There is elevation of the disphragm from a fluid and gas containing pocket, which proved to be a subphrene abscess.

silk. One thousand cubic centimeters of blood and a liter of 5 per cent glucose were necessary to support the patient during the operation. A moderate amount of bloody exudate was appurated through a bronchoscope at the end of the operation. After he was returned to the ward a Wangensteen suction was applied to the anterior catheter in the 2d interspace—a commercial type of apparatus being used

The postoperative course was stormy Suddenly he was found to be unusually dyspneic and it was then discovered that the suction apparatus was improperly connected thus creating an artificial hydrothorax. The chest was immediately aspirated as oxygen under positive pressure was given but the lung did not re-expand immediately However it did re-expand gradually and drainage from the posterior catheter continued for a period of 33 days. The temperature ranged from 100 to 104 degrees F 14 days postoperatively. He was discharged to the Zone of the Interior 37 days postoperatively There was no evidence of repocketing. His general condition was excellent and the lung had re-expanded to an estimated 85 per cent of normal (Postoperative x ray films are not available)

In patients that have a traumatized compressed lung for a period of 3 weeks or longer it is noted that the lungs are nonresilient to reexpansion and any added difficulty preventing re-expansion serves as a definite hazard



Fig. 8. a Mmost complet collapse of the right hing from multiloculated empyema and clotted hemothorum. b T enty-seven days after operation, the in-girre-expanded,

Ithough the diaphragm is slightly levated. The three for eign bodies hich ere not removed t operation are now visible

In this case an artificial hydrothorax was produced which added greatly to his period of convalescence. It should be emphasized that only simple home made suction apparatus should be used in these cases. We are opposed to the use of any complicated apparatus as such frequently confuse even the expert attendant.

CASE C. This patient wa injured by a mortar shell which resulted in a sucking right h motherax need abdomen and a compoun! comminuted fracture of the right radiu and ulna. He was admitted to an evac uation hospital 7 hours after wounding. His condition was fair but he was given 500 cubic cent meters of blood and 500 cubic centimeters. I pla ma prior to and during debridement of wounds and explorat ry laparot my The sucking chest a und after lébridement was closed without drainage to the pleu ral cavity the laparotomy revealed no visceral in jury. There was no record of preoperative aspiration liter operation he was aspirated of air anteriorly a diposteriorly Intercostal nerve block, 4th through 11th nerves was effected. The following day 1000 cubic cent meters of air and 400 cubic centimeters of fluid were withdrawn. Two days after operation a temperature of 101 degrees I wa recorded Repeated aspirations yielded a small amount of turbid evudat at three different sites and only 100 cubic centimeters of air Roentgenogram (Fig 8a) revealed the lung partially collapsed and obscured by a dense thickness which was thought to be clotted hemotherax. Blood

penicilla and other upport ve measures were continued. From the aspirated fluid hemosylic streptococci were cultured. Further aspirations were used costful. The patient, general condition was growing a rec. In ver of the find go, t was apparent we were dealing as the amultifoculated empressaassociated as the granizing bemotherax. Any temportizing under the dealing with an approximation of a title disapproximation—for that reason decortication was performed to days after wounding.

The 8th rib wa re-ected in the posterior aufflary lin (the mersion was made n usually low t avoid the riginal chest wound). The chest cavity wa filled with multiple compartment to taining nonslorous, gelatin lik hbrin and pus. Th. lung was So per cent collapsed and beld down by a well organ used sheet f hibrinous exudate. This constricting band was rather easily peeled thus allowing the lung to re-expand c mpl tely Three small ( reign bodies were known to be located in the base of the lower lobe, which was the lite of a large hemat ma Due to the fact that these foreign bodies could not be palpated, it was felt unwise t attempt their removal. Three catheters were placed two anteriorly and one in the postera i azillary lin Penicilin (100,000 units) was then introduced into the pleural cavity. Bronchoscopic aspiration at the end of the operation yielded a moderate amount f mucu. One thousand cubic centimeters of blood were given during the opera

The postoperative course was most satisfactory A temperature of 99 degrees F was the highest re-

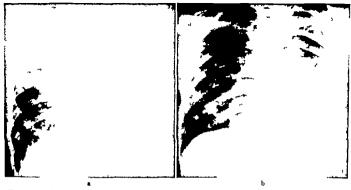


Fig 9. a, The left chest is obliterated by fluid and a "thickened pleura." At operation it was disclosed to be a sheet, z to 6 centimeters in thickness, of organizing ex idate. b Roentgenogram which was taken 4 weeks fol

lowing operation, shows satisfactory re-expansion of the lung. The shadow which was present at the base was attributed to the remaining fibrinous layer on the dia phragm and parietal pleura.

corded after operation. Catheters were all removed by the 7th postoperative day. Later thoracenteses found no blood fluid or air. At the time of discharge (Fig. 8b) the lung had completely re-expanded but the right diaphragm remained elevated and the pleura was thickened at the base. He was discharged 27 days after operation.

This case illustrates early decortication for multilocuated empyema and organizing hemothorax with compression of the apex of the lung. The relative ease with which the organized membrane stripped from the visceral pleura is remarkable and may be attributed to early operation without preliminary drain age. It is thought that this method of manage ment should be adopted in those cases of empyema in which decortication is indicated.

CASE 6 This soldier was treated in an evacuation bespital for a period of 10 days following chills fever and pain in the left chest. Disgnosis there was lobar pneumonia. He did not respond to penicillin therapy Therefore he was transferred to the medical service of a general hospital. The patient appeared acutely ill with a respiratory rate of 20 and a temperature of 1024 degrees F. There was duliness over the entire left chest area (Fig. 92) with diminished tactile fremitus. After numerous attempts to aspirate the fluid 500 cubic centimeters of greenish colored fluid were obtained only from the 5th intercestal space in the midstailiary line. There 50 000 units of penicillin the midstailiary line.

were injected into the pleural cavity. Cultures showed a few hemolytic streptococci. The patient was transferred to the surgical service 3 days after admission.

Repeated chest taps local aneathesia being used located purulent exudate in the 5th intercostal space in the anterior axillary line at which site a catheter was placed through a trocar and connected to a water seal jug. In the 9th interspace in the posterior axillary line fluid of a different character was obtained a greenish thin transudate A second catheter was inserted into this pocket. Further taps did not yield additional fluid.

The catheters cessed to drain after 3 days. Anow mg that multiple pockets of pus were present, the problem of individually draining them seemed impractical. Therefore we thought the patient was a candidate for decortication.

Five days after institution of catheter drainage thoracotony with decortication under endotracheal gas-oxygen-ether anesthesia was done. A posterolateral lincialon with resection of the pith rib was used In the posterior gutter the lung was tenaciously adherent and collapsed against the chest wall. Multiple thick walled pockets of cheese like material were ruptured and evacuated. This brought us down on the thick adherent capsule that held the lung compressed. With considerable difficulty, the visceral pleura was eventually denuded of this sheath of or ganizing exudate measuring 2 to 6 centimeters in thickness. Under positive pressure the lung was in flated to normal expansion. Bleeding was very an oxyging over the entire surface of the visceral pleura monging over the entire surface of the visceral pleura.



Fig. 8. a. Almost complete collapse of the ...ght lung from multiloculated empyrma. Ind. clotted hemotherax. h. Twenty-ses en days after operation, the lung is re-expanded,

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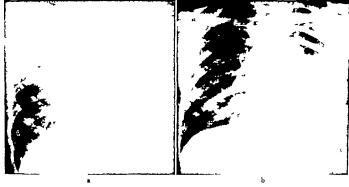


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from which the adherent aheath had been extirpated Several rents in the visceral pleura were sutured with silk and tested under water for leakage. Closure was made in anatomical layers with silk autures. Mushroom catheters were placed in the ad interspace anteriorly and in the 7th interspace in the posteroaxillary line The patient received 1000 cubic centimeters of blood and 1000 cubic centimeters of 5 per cent glucose during and immediately after opera tion Following the operation bronchoscopic ampira

tion was performed for excessive bronchial secretion Four days later the anterior catheter was removed Progress seemed satisfactors. The posterior cathe ter was removed on the 7th day. No further pocket ing developed \ rsy examination (Lig ob) showed good expansion of the lung 4 weeks after operation

Six weeks after operation convalescence was essentially complet with patient ready for discharge to class B duty

This postpineumonic sequel is uncomon since the advent of chemotherapy. It was interest ing to note that the pathology encountered was not grossly different from that in the multiloculated post traumatic empyema. The cansule however was more tenaciously at tached to the visceral pleura and there was a definite increase in the bleeding from the decorticated pleural surface

#### BUNMARY

- The indications for radical and conservative management in acute empyema are briefly discussed.
- 2 Certin points in the technique of nul monary decortication for acute empyema are emphasized
- 3 Six cases are presented in which thorseotomy with evacuation of the pleura and pulmonary decortication was employed in acute empyema. In one of these cases the empyema was a postpneumonic injection. All others were post traumatic infections.
- 4. Early operation without preliminary drainage seems advisable when the indica tions for the radical management are present.
- 5 Penicillin was not used in 1 case and was of questionable value in others but its routine use is recommended

#### CONCLUSION

Early radical surgical attack in selected cases of acute empyems will greatly reduce the incidence of chronic empyema and "pulmonary cripples.

#### OSTEOGENIC SARCOMA

## II Roentgenographic Interpretation of Growth Patterns in Bone Sarcoma

IAN MACDONALD M D and JOHN W BUDD M D Los Angeles, California

HE speech and reports of roentgen ologists when concerned with bone tumors are studded with such words tvoical 'characteristic even diagnostic. Sutherland has stated that given adequate technique, the same information that is available in the cut section of tissue prepared for microscopic study can be obtained from the roentgenogram More recently McNattin relying exclusively on roentgenograms as an accurate method of diagnosis has proposed that the primary treatment of bone sarcoma should be by massive doses of x radi ation even to the point of necrosis

It should be emphasized that the authors of this essay are not diagnostic roentgenologists but we believe that radiographic arbiters such as Sutherland and McNattin ascribe to bone tumors a fixity of roentgenographic pattern that simply does not exist. Our thesis is that the roentgen ray study of bone tumors is an interpretation of the activity of the neoplasm and equally of the character of the stromal response. Thus the appearance of a bone tu mor at a given time depends upon the balance between neoplastic activity (osteolysis) and the degree of cortical and medullary reaction (sclerosus) as well as the absence or extent of ossification and calcification. The sun ray appearance of many osteosarcomas may be due either to new bone formation or calcifica tion in parallel striae and may be seen in chondrosarcoma and even in neoplastic met astatic ledons of bone Even Codman's time honored reactive triangle may be seen in chronic periostitis. In short, typical roent genographic features are a reflection of growth characteristics rather than an indication of tumor types a kinelic rather than a static concept

The observations presented here are part of a study of 118 cured cases of bone sarcoma From the School of Medicine University of Southern California

and a smaller number of uncured cases from the Registry of Bone Sarcoma of the American College of Surgeons The primary objective in the review of these cases was to determine whether there were special features in the nat ural history and histopathology of the cured cases sufficiently distinctive to account for their curability. Such features have been es tablished and were the subject of another communication but certain general features of histopathology and nomenclature are highly pertinent here

Of first importance is the definition of terms. The expression osteogenic sarcoma is used widely and interchangeably to signify a malignant tumor originating in or producing bone. We accept the term as indicating an origin in bone but not necessarily producing bone a definition which is also approved by Ewing and other writers. Osteogenic sarcoma then becomes a generic name for those sarcomas arising in the connective tissues of bone distinguishing this numerically large group from those of less frequent incidence arising in hematopoietic endothelial and adipose tissue elements of the medulla.

Two of the connective tissue surcomas of bone are well known those predominantly producing bone and cartilage osteosarcoma and chondrosarcoma Our study of the cured cases emphasized the importance of the third member of the group which is fibroblastic in nature The proposed division of the connective tissue sarcomas is shown in the classifica tion presented here in which bone producing sarcomas are designated as osteo-arcoma a proper etymological expression to match the terms chondrosarcoma and fibrosarcoma The roentgenologist may make a diagnosis of os teorenic sarcoma with reasonable expectation of verification if there is evidence of a cortical malignant tumor This study has led us to the

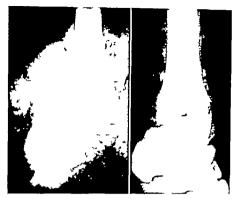


Fig. left Metastatic adenocarcinoma simulating primary estrogenic sarcoma. Ilg. 2. Chondrosarcoma, early peripheral. ( ) B.S.R. N = 6

conclusion that radiographic criteria are highly unreliable in attempting a more accu rate differential diagnosis of osteogenic sarco mas

The prognostic importance of differentiat ing the three connective tissue sarcomas how ever is shown in Table I Osteosarcoma or true bone producing sarcoma is a highly lethal disease represented by less than 12 per cent of the cured while it accounts for 40 per cent of the fatal cases. (Table I) Fibrosarcoma is the ( Numbers in parentheurs refer to schematic chart) Fig.

least malignant member of the group ac counting for 17 per cent of the cured but only is per cent of the uncured patients. Chondrosarcoma seems to occupy a median position

between these two extremes. An interpretation of the growth pattern of bone tumors by experienced roentgenologists, according to a kinetic concept should differ entiate with almost complete accuracy between benign and malignant tumors While the differential diagnosis of bone sarcoma mto tumor types by radiographic methods seems

	MODIFIED CLASSIFICATION	OF BONE TUMORS
Type of times	Malignant	Besign
Connective	Outrepartoma   Outrepent mirrors	O-teoma Chondroma
Undeterment	Mahgusat gient cell tumor	Benga gant cell tumor Epsphysial chondromateus gant cell tumor
3 Enciotaciani	(a) Amportatelerizates (b) Defrate metablishman (Ewing surceme)	(a) Plantform ampume. (b) Cavernous ampume.
4 Hermatopoietic Erythroposetic Mysload Lymphosel Raticular	() Erythracytema (b) Mysiccytema, myrloma () Lymphacytema (d) Retrackcytema	
s. Admon	Liponrount	



Fig. 3 left. Chondrosarcoma, peripheral. (2) B.S.R. No. 1256 Fig. 4. Chondrosarcoma, peripheral. (3) B.S.R. No. 777

to us more speculative the material reviewed permits the recognition of features commonly seen in the connective tissue sarcomas

Osteosarcoma arises in the metaphysis and may be predominantly sclerosing or osteolytic. The sclerosing form is more common and may be peripheral or central in origin. The peripheral sclerosing is the classical type in which the tumor early elevates the periosteum usually with dense radiating striae and Codman's reactive triangle. With continued growth there is progressive sclerosis of the cortex and medulla and soft tissue extension in advanced cases. The only sign of central sclerosing os teosarcoma may be a dense obliteration of the cortical striae while secondary destruction in the medulla produces a mottled appearance.

The pure osteolytic form of osteosarcoma is the old telangiectatic bone aneurysm and represents a rare and extremely anaplastic form There is irregular expansile destruction of the cortex little or no periosteal reaction. There may be early perforation and bulky soft tissue masses invasion of the epiphysis and adjacent ioint.

Chondrosarcoma arises in the ends of the diaphyses of long bones in flat bones and ver tebrae. There are two well defined forms peripheral and central. In the peripheral an irregular productive periosteal growth is the earliest stage. Calcification is extremely common in chondrosarcoma and is responsible for its radiopacity. It may early perforate the periosteum and produce bulky lobulated soft tissue tumors or blotchy irregular masses

TABLE I —PERCENTAGE INCIDENCE OF FORMS
OF OSTEOGENIC SARCOMA IN 5 YEAR SUR
VIVALS AND IN NONSURVIVALS

	5 )**	ns cures	Uncured	
	٧.	Per cent	١.	Pe cent
Ostrovarcoma	4			*
Chondresarcoma	56	47.5	,	40
1 lbrosarcoma	37	3 4	7	
Complex sarcomas				1
Not disposed				
Nepestregraic	•			
Tot I		1	7	.1

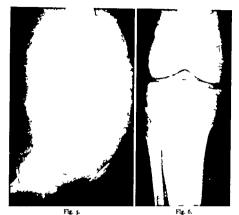


Fig. 5 Chondrosarroma, calcifying, peripheral. (4) B.S.R. No. 30. Fig. 6 Chondrosarroma, central scienosing type. (7) B.S.R. No. 3.

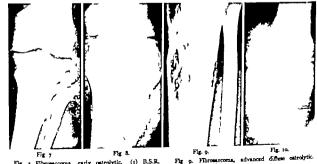


Fig. 7 Fibrosarcoma, early outcolytic. (1) B.S.R. Fig o.

N 60.

Fig 8 Fibrosarcoma, outcolytic. (2) B.S.R. No. 941

Fig. 10

Fig. 9. Fibrosarcoma, advanced diffuse estrolytic (4) B.S.R. No. 1744. Fig. 10. Fibrosarcoma, estification. (5) B.S.R. No. 407

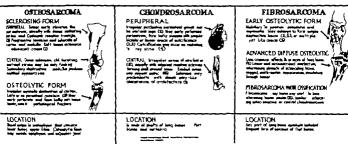


Fig. 11 Roentgenographic interpretation of evolution of osteogenic asrcoma.

of calcifying neoplasm Calcification may also occur in linear striated style simulating peripheral sclerosing osteosarcoma. The central type of chondrosarcoma often produces irregular areas of rarefaction usually with adjacent reactive sclerosis forming a shell around the tumor. Eroded areas may appear cystic and resemble fibrosarcoma. Sclerosis and calcification may predominate in the central type with dense ivory like obscuration of architecture.

Fibrosarcoma may arise in any part of a long bone epiphyses included It is a frequent form of sarcoma of flat bones The most com mon form is the osteolytic. In its early stage its origin may be evident as medullary corti cal or periosteal. It may enlarge to form a single predominantly destructive lesion with little or no reactive sclerosis or periosteal thickening They are most commonly non expansile tumors Radiographic evidence of extension is frequently that of an irregular spotty osteolytic process with or without scle rosis of adjacent bone. Multiple cyst like areas are not uncommon and should not be confused with mant cell tumors for the out line of the pseudocystic areas is irregular and there is usually adjacent progressive osteolysis. The microscopic picture is usually en tirely comparable to that seen in soft tissue sarcomas These forms are frequently slow or even indolent in their growth and 5 year cures have been obtained by amputation after repeated local operations

There is an advanced diffuse osteolytic form of fibrosarcoma less common which affects one third or more of a large bone in which there are linear and circumscribed areas of rarefaction with intervening strands of scle rosing bone. The result is a ragged moth eaten appearance which may simulate Ewing's sarcoma.

In any soft tissue fibrosarcoma ossification may occur Most ossifying fibrosarcomas in bone in the past have been diagnosed as os teosarcoma. Ossification in fibrosarcoma of bone results in a sclerosing lesion which may be difficult to differentiate from osteosarcoma or sclerosing chondrosarcoma. Ossification may occur only in parts of a fibrosarcoma with other areas of osteolytic character making the diagnosis more plausible

The simulation of primary bone tumors by metastatic lesions has been repeatedly observed by us in the past 4 years One of the most striking of these is that shown in Figure 1. This patient's past symptom was that of

1 This patient a past symptom was that of pain in the thigh just above the knee. The x ray films were diagnosed without equivocation by three roentgenologists as typical osteosarcoma.

When a biopsy was obtained the microscopic features were those of an adenocar curoma metastatic from the prostate gland. Since this rather astonishing discovery met astatic leasons from the stomach ovary lung and breast have been observed as producing essentially the same picture.

### SUMMARY

The roentgenographic interpretation of bone tumors is properly a study of patterns of neoplastic activity and the character of the stromal response a Linetic rather than a static concept. The roentgenologist can determine with a high degree of accuracy the benig nancy or malignancy of a given lesion Further differential diagnosis of tumor types by radiographic methods must be regarded as speculative. Metastatic lesions may simulate perfectly the appearance of primary sarcoma of bone. Microscopic study of tissue obtained by open biopsy remains as the most essential single diagnostic method in tumors of hone Ewing a sarcoma (endothelial myeloma) is a notable exception for in tumors presenting suggestive evidence of this lesson a therapeu to test with small doses of x radiation is a valuable diagnostic and In general formal blopsy of bone tumors should precede the in stitution of any therapeutic program either surgical or radiological. All reliable evidence fails to establish any barned in open or needle biopsy of bone sarcomas. To employ intensive irradiation of bone lesions on reentgenographic evidence alone is an unwarranted in tellectual obeisance to a fallible diagnostic measure.

### RITERINCES

- Chowell, B.C. Supplement to 26th Year Book, p. 18.
   Chicago America College of Surgeons, 94
   Macroo atto I and Burn, J.V. Surg. Gyn Obst.,
- 043.77 4.3.4 3 M Natri RF Radiology 044.4 446.
- 3 MATTI KI Karilology 944,4 440. 4. Suthirland ({ \m | Roent 941,47 534=540.

## ACQUIRED ESOPHAGOTRACHEOBRONCHIAL FISTULA

## O THERON CLAGETT M D F.A C.S JOHN H PAYNE, M D and HERMAN J MOERSCH M D Rochester Minnesota

COUTRED esophagotracheobronchial fistulas are of infrequent occurrence and have
a poor prognosis and a high mortality
rate. These fistulas are most often assocated with malignant disease of the esophagus or
trachea and occur as a late or terminal complication of the underlying pathologic process.

One must have a clear concept of the anatomic relation of the esophagus to the traches in order to appreciate the case with which these fistulas may occur. The esophagus begins at the level of the cricoid cartilage and descends in front of the vertebral column through the superior and posterlor mediastinum. It passes through the dia phragm and ends at the cardia of the stomach The trachea lies just anterior to the upper portion of the esophagus, being separated from it by a few lymph nodes which are most numerous in the region of the bifurcation. As the esophagus descends in the thorax it curves to the left and is crossed by the left main bronchus. It then passes to the right and behind the arch of the aorta and descending in the posterior mediastinum lies to the right of the thoracic aorta. Lower in the thorax it passes to the left and anterior to the aorta. Since the trachea and the upper part of the esophagus lie in such close apposition it is easy to understand how a pathologic process of one organ may apread and involve the other organ secondarily

### CAUSES

There are five main causes of esophagotracheobronchial fistulas. In order of their frequency they are as follows

- 1 Malignant disease of the esophagus
- 2 Infectious disease of the esophagus, traches or pleum
  - A. Tuberculosis
  - B Syphilis
  - C. Fungus infections
  - D Suppurative esophagitis
  - E. Nontuberculous empyema
- 3. Traumatic injuries of the esophagus
- 4. Esophageal diverticula
- 5 Esophagomalacia

Carcinoma of the esophagus is the most frequent cause of fistula formation Ewald stated From the Divisions of Surgery and Medicine, Mayo Clinic. that 50 per cent of carcinomas of the middle third of the esophagus are associated with fistula. Tinney and one of us H J M 15) reported a senes of 30 cases of fistula in 14 cases (36 per cent) the fistula was associated with carcinoma of the esophagus. In 4 cases (to per cent) the fistula was the result of a malignant lesson which arose in the thyroid in the trachea or in the homenhus.

Lymphoepithelioma of the lower part of the pharynx may also cause fistula formation. Boyd and Goldbloom have reported a case of this nature.

Infectious diseases of the esophagus traches. pleura or adjacent lymph nodes are the second most common cause of fistula. Tuberculosis is a frequent etiologic factor it may cause fistula for mation in several different ways. Heddaeus and Riviere expressed the belief that fistulas may arise from a breaking down of caseous lymph nodes which ulcerate into the trachea and esophagus. In Pachnio's opinion tuberculosis causes an esophageal ulceration with subsequent perforation Kelly and Henderson expressed the belief that tuberculous lymph nodes may perforate into the trachea and esophagus as the result of a slow process of ulceration on the outer walls of these structures. In their opinion also tuberculous lymph nodes in healing may cause the formation of traction diverticula which enlarge, ulcerate, and finally rupture to form a fistula. Tuberculous ulcers of the traches or bronchi may perforate into the esophagus and form a fistula. Tuber culous empyema of long standing occasionally will cause an esophagobronchial fistula to form.

Syphilis may cause the formation of esophagobronchial fistula in two ways. It may give rise to gummas in the esophagus or air passages, which eventually ulcerate perforate, and form fistulas. Bucher and Ono reported 13 cases of this sort Syphilis also may cause fistula formation through the development of an aneurysm which from prolonged pressure, may produce an esophagotracheal fistula. Dorner has reported a case of this nature.

Actinomy costs is a rare cause of fistula for mation but Vinson and Sutherland reported such a case. The patient lived for 20 years after the development of the fistula.

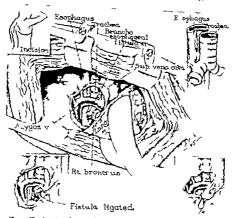


Fig. Fixtuleus tract between the right main bronchus and the cooplagus. Its relation to the saypos win and to the superior vens core and the traches as all seen leasts show the fundation, a larger rider of the fatule, the festaleus tract ligated and the relation core of the figure of the fittings tract. It he plans.

Phlegmonous or suppurative enophagitis may give rise to a fistula. Such an inflammatory process may result from the action of some corrosive chemical that has been availowed or it may be secondary to a pulmonary or pleural infertion of long standing. Berman and Walters reported a case in which a fistula was due to nontiberculous empyema. In cases of nontuberculous empyema fistulas are more likely to occur when a hard rubber tube has been used to drain the pleural space for a prolonged period than under other conditions.

Traumatic perforation of the csophagus, either by some forcego body or by instrumentation may give rise to a fistula. Rarely diseased bone in an adjacent vertebra may came fistula formation Judd Havens, and two of us (O T C, and H.J.M.) reported a case in which fistula was due to a bullet wound. Surjudical treatment of the fistula was successful. Murtagh and Tyson have reported a fistula due to a piece of bone lodging in the anterior esophageal wall. The fistula healed promptly and completely on removal of the bone.

Esophageal diverticula whether they are of the congenital or of the acquired traction type, continually cause the formation of fattales. These arise because of inflammation and alcention of the diverticulum with accordary perforation into the traches or broachi. Occasionally the diverticulum may cause a mediastinal abscess which can reputure into a broachus, thereby forming a familia. Davidson and Mills stated that esophagomalical in a rare cause of esophagobronchial fittula. This occurs as an agonal manifestation in cases of cerebral disease, as a result of digestion of the esophageal will be yearter content of the esophageal will be yearter content.

### SYMPTOMS

Although as a rule congenital tracheo-explagcel futules manifest their presence at once by a cleinite group of symptoms, acquired fatulas may be present for varying periods before they produce symptoms. There is generally a fastery of varying degrees of dysphagia gozdusly increasing in seventy. Then suddenly cough develops as well as despines when the patient exit and he raises purulent sputum and occasionally blood. At first these symptoms follow the inrestion of hould foods but later on they may follow the ingestion of either solid or liquid food. Lukens and Ono stated that coughing and dyspnea are most likely to occur when the patient is on his left side in an upright position or leaning forward when he swallows Allen has reported 2 cases (proved roentgenologically) in which a fistula was present but the patient had not had any symptoms. If one suspects the presence of an esophazotracheobronchial fistula, a bronchoscopic and an esophagoscopic examination should be per formed in an endeavor to visualize the fistulous opening. A roentgenoscopic examination of the esophagus should also be performed after the patient has swallowed a small quantity of radiopaque oil. These patients should not be given barlum to swallow as it is very urntating to the parenchyma of the lung whereas radiopaque oil is not.

### TREATMENT

The treatment of esophagotracheobronchial fistula varies with the cause of the condition. When fistula arises from malignant disease, there is really no treatment available, as the fistulas are terminal complications and the patients will die of the malignant lesion regardless of their treatment. Some of the other types of fistula though, are amenable to various forms of therapy Clerf Cooley and O Keefe have reported 2 cases in which esophagotracheal fistula was successfully treated by the application of crystals of sodium hydroxide. These crystals were fused on an applicator and pressed against the fistula for 3 minutes. This procedure was repeated 3 weeks later. Im perators has reported a case in which a high fistula was treated by excessing the fistulous tract and closing the esophagus and traches separately with interrupted sutures. This procedure was done by opening the anterior wall of the trachea and work ing on the fistulous opening in the posterior portion of the trachea. When these fistulas arise from empyemas, Cohen and Sindell advocated adequate drainage of the pleura and prolonged esophageal rest by the use of nasal tube feedings or sustrostomy feedings. This regimen is followed until the esophagenl fistula has had adequate time to heal. Judd Havens, and two of us (OT C. and H.J.M.) have reported a case in which a traumatic fistula was closed by excision of the fistula and individual closure of the esophagus and traches with reinforcement of the suture lines by transplantation of the omohyoid muscle into the Pres.

### REPORT OF CASE

We wish to report an additional case at this time in which the fistula was cured by operative intervention. The pa-tient was a 50 year old white woman whose past history was negative except for a previous ectopic pregnancy that had been handled surgically. She had been in good health until 3 years before her admission to the Mayo Clinic. At this time a piece of meat had entered her traches while she was eating, and, after this, a cough and an aching in her thorax developed. Six weeks later the meat was removed with a bronchoscope. She continued to cough, however, and on one occasion coughed up some pieces of calcified material. Her general health was good until one year prior to admission when progressive dysphagia developed. She soon noted severe paroxysms of coughing on taking liquids and regurgitated the liquids. She gradually lost 40 pounds (18.1 km.) At the time of our esophagoscopic examina tion she was found to have a sinus opening on the right lateral wall in the middle third of the esophagua. On bronchoscopy she was found to have a fistulous opening in the posterior wall of the right main bronchus through which esophageal accretion was coming

Surgical exploration and closure of the fistula were ad vised. Preoperatively the patient was given 4 grams of sulfadiazine for 3 days. Transiboracic exploration was performed through a right posterior lateral incision, with removal of part of the sixth rib. Exploration of the esophagus and the lower part of the traches disclosed a fistulous tract between the esophagus and the right main bronchus with many calcified lymph nodes in the region (Fig. 1) After the fistula had been dissected free, its esophageal end was ligated and turned in with interrupted cateut sutures. The bronchial end of the fistula was lighted separately and covered with pleurs. The operative site was washed with saline solution and sephiran chloride (x 10,000) and 5 grams of sulfanilamide were duated into the pleura. An intercostal catheter was inserted and the thorax was closed in layers. A Levine tube was passed into the stomach. The patient was given 80,000 units of peni cillin intramuscularly each day for the first 11 postoperative

Jefunostomy feedings were begun through the Levine tube on the second postportative day. The patient was allowed to dank clear liquids on the seventh day and the nasal tube was removed on the tenth postoperative day. A liquid diet then was begun and was gradually shifted over to a soft diet.

When the interconsal catheter was removed on the fourth postoperative day the lung remained will expanded. Thoracenteels was performed on the eighth and twelfth days and the patient was dismissed on the twenty first day ling good condition. She was eating a soft diet and had not experienced any dyshagis, dyspace, or coughing since the operation. The report of the pathologist on the specimen of tissue that was removed at operation was chronic inflammation and tuberculostic.

### CONCLUSIONS

In conclusion one may see that these esophagotracheobronchial fistulas are a serious problem. In cases of fistula caused by some malignant condition the malignant disease itself is fatal. Those fistulas not associated with malignant conditions have a more hopeful outlook, although many of these patients, regardless of the cause of the fistula die of aspiration pneumonia, pulmonary abscess, or gangrene. This is especially true when the fistules are of considerable size. Direct sur gical attack with closure of the fistula is feasible in some instances and some of the smaller fistulas may be treated adequately by the local application of crystals of sodium hydroxide.

### REFERENCES

- 1. ALLEN, W E., Jr. Radiology 1934, 2 366-368.
- s. BERMAN J K., and WALTERS, C.E. Ann. Surg 1943.

- SHEMM JA. S. BONDANDER ON J. C. F. ADA. SUIT 1943-117 107-108 GORDBROOM, A. A. Bull. N York M. Coll., 1948. 19-45. BOCHER, C. J. and Orso, Jo. Am. J. Path., 1934. 5. CLEEF L. H. COLLEY E. E., and O'KEEFE, J. J. Suir, Gyn. Obst., 1943, 2716. 5-537. G. CORES W. and SIDNELL, E. A. West. J. Suirg. 1944.
- 50 235-240.
  7 DAVIDSON P B and MILLS, E. S Med. Clin. N

America, 1913, 7 999-1 17

E. S. (7)

E. S. (7)

Q. EWALD

14 334-339. 15. Monasca, H. J. and Thours W. S. Med. Clin. N. America, 944, pp. toot 907 16. Muzzaoz, J. A., and Tysox, M. D. N. England J. M.

8. DORNER, G. Quoted by DAVIDSON P. B. and Milita.

HEDDATT, JUL. Quoted by DAYIMON P. B. and MILLE, E. S. (7)
 IMPERATORI C. J. Arch. Otolar., 1939, 30 337-359.
 JUDO, E. S., CLAGETT, O. T. HAVENI, F. Z., and

Kelly, A. B. and Henoremon F. L. J. Lar. Otol., Lond. 939, 54: 95-98.
 LUERSE, R. M. and Ono, Jo. Laryngoscope, 934,

MORRICE, H. J. Proc. Mayo Clin., 1944, 19: 06-

Quoted by DAYMSON, P. B., and Mills.

- 17 PACISITO, F 204-495 17 PACISITO, F Quoted by DAVIDSON and MILLS (7) 18. RITHER. Quoted by DAVIDSON and MILLS (7) 9. VIDSON P P and SUBMILLAND, C. O. Radiology
  - 1926 6 63-64

### GUNSHOT FRACTURES OF THE TEMORAL SHAFT

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ZONE of Operations often affords an unusual opportunity of observing large numbers of compound fractures of the I femoral shaft an injury not often encountered in civilian practice This study is based upon a series of 82 cases received at a General Hospital during the campaign in North Burma from October 1943 to August 1944 It includes all complete compound fractures of the shaft, some of which were communited into the knee joint. Purely condylar fractures and those involving the head and neck are not included because they bring up different problems in management. This study has it is believed, en hanced value because the majority (85%) of the cases were Chinese soldiers, and it was possible for us to observe the patients from very shortly after their injury until the time when the end results could be ascertained with a reasonable degree of certainty American soldiers, comprising 15 per cent of the series, were evacuated to the Zone of the Interior as soon as this could be done with safety. The mortality of the entire group was 4.0 per cent.

There was no significant variation in the side of the body concerned but the lower third of the shalt was most commonly involved. Approximately half of the cases were at this level and 8 of these, to per cent of the total, involved the knee joint. Middle third fractures are common in civilian practice, but accounted for only one aixth of this series. The remaining third were in the proximal portion of the shaft. A rifle bullet was said to be responsible for the wound in 51 for per cent, of the cases, and shell fragments, most frequently from a mortar accounted for the others.

### TIME OF ADMISSION

Sixty per cent of the patients were admitted withm 48 hours of injury and of these two thirds were admitted within the first 36 hours. Early in the exampaign there were delays in evacuation in a number of instances so that the average time interval was 5.9 days from injury to admission. Once the air evacuation system had been per fected, patients were received within an astonishingly brief time, especially when it is realized that a litter haul for varying distances was required before a plane tipp of 100 milles or more.

### MANAGEMENT BEFORE ADMISSION

Debridement. It is our opinion that in a great majority of patients the treatment received in the forward areas was of the highest quality. Of the 82 cases, 70 or 85 per cent, had received wound débridement prior to admission. There were 10 patients, 12 per cent, who had not been débrided prior to admission One of these had a primary type of wound excision performed after admission. but the others presented wounds which were not considered suitable for any procedure other than the providing of adequate drainage. In 2 cases it was uncertain from the data accompanying the patient and from the appearance of the wound whether débridement had been performed. Of the 70 cases in which debridement had been done. the time interval between lajury and operation was accurately determined in 66. It is a tribute to the medical personnel in the forward areas that 51 77 per cent, of these were débrided within 12 hours and that only 15 23 per cent, had operations after that period Of the entire group of 82 patients, it is known that 62 per cent were debrided within 12 hours of their injury

The débridement, it is felt, was adequate in most cases. Improvement in the condition of the wounds was readily noted as the experience of the forward surgeons increased. In a few cases it was apparent that there had not been sufficient m cision of the deep fascra and in some, injured muscle and foreign bodies were not removed, thus causing subsequent difficulties. Occasionally vaseline gauge had been inserted tightly in the wounds and acted as a cork instead of a drain. In such instances removal of the gauze was followed frequently by a gush of purulent material. Wide incision of skin to explore the depths of the wound, and counter incisions posteriorly on the medial or lateral side, were recognized as helpful measures in avoiding wound complications.

It is not known how many patients with this type of myury succumbed to shock or hemorrhage in the forward areas. However it soon became apparent that next to the treatment of shock and hemorrhage, the adequacy of the débridement was the most important part of the primary treatment both as to the saving of lives, the avoidance of soft tissue and bone infection, and the rapidity of convalescence.

Sulure In only one instance had the wound been satured before admission. The sutures were removed upon arrival at the hospital. Our experience with other cases in which bettle wounds were sutured primarily has convinced us of the wasdom of the Surgeon General s Circular letter No. 189, dated November 17 1943 which forbids primary suture of such wounds. The gravest complications may ensue if immediate closure is performed. In some of our cases had any form of internal fixation of the fracture been attempted.

Immobilization The commonest type of immobilization used in the forward areas was the plaster space. Most of these were double spices. with plaster down to the toes on the affected side and to the knee on the opposite side. Of the entire series, 68 patients, 8; per cent, were so immobilized. Although many of the spice plasters were broken at the groin, the patients were for the most part comfortable, and this method of temporary fixation seemed entirely satisfactors. In a cases a Kirachner wire had been inserted through the femur and incorporated in the plaster but this seemed unnecessary. In our opinion the function of the forward stations. once excusion and immobilization has been ac complished, is to evacuate the patient to a fixed installation for definitive treatment as soon as possible. If this can be done within a week, only ordinary precautions need be taken for the maintenance of length and for the proper alignment of fragments. The only thing that is required, after the care of the wound and the treatment of shock and hemorrhage, is comfortable transportation by a method which will prevent motion of the framments. Adequate reduction can be obtained when the fixed installation has been reached.

It is inadvisable to cover with plaster any wound that has not been debrided, unless specific notation of this omission has been written plainly upon the plaster. It is also inadvisable to apply a nonpadded plaster when a patient a circulation cannot be continually and carefully watched. Padded plasters should always be used for transportation. If unpadded plasters have to be used because of lack of suitable material for padding the plaster must be split longitudinally through its entire length. The application of a nonpadded plaster especially in the region of the calf, proved to be an important factor in producing circulatory disturbances in several of our cases. Plaster fixation is a definite disadvantage in those instances in which wound infection is suspected. If infection is likely a window should immediately be made over the wound for early inspection

or the plaster should be removed entirely. It is probable, if earlier wound inspection had been made, that one of the deaths in this series could have been prevented.

In 12 cases, 15 per cent, immobilization was obtained by means of the Army half ring leg splint. This splint gave satisfactory temporary immobilization of the fragments but several points are worthy of mention. Any form of hitch used around the foot and ankle is dangerous because it may produce circulatory obstruction or pressure necrosis. Skin traction by means of broad adbesive strips or stockinette is the method of choice. Circular adhesive strips should not be used. Smoothly applied gauge bandage should be used to anchor the adhesive. Pressure from adhesive over the malleoli and over the head of the fibula should be avoided. The adhesive or stock inette should extend to a point just below the wound. When possible, a wooden spreader should be employed. If the lateral adhenve arrin is applied somewhat more posteriorly than the medial one, there will be a tendency to correct the external rotation deformity

The "Tobruk splint was not used in any of our cases. In 3 of them, however the wound and the adjacent area of the Army key splint were incorporated in a plaster cuff. It is left that when there is a shortage of plaster in the forward area, immobilization can be astifactorily obtained by means of the Army key splint, provided that such fixation is not maintained for more than a few days and that no ankle or instep hitches are used. The plaster spice, however is preferable.

Two patients arrived without any form of immobilization. Both were in poor general condition and had severely infected wounds.

Sulfonamete and outlants. In 94 per cent of the patients there was either a written record of sulfanilamide having been used in the wounds or evidence of it on inspection. It is entirely posible that sulfonamides were applied locally to all wounds. In 40 per cent of the cases a bistory of written record of the outlaw local sulfanilamides was obtained. It is probable that a large number and taken the fong. Two sulfonamides, sulfadisation and sulfathlasole were used and these in about an equal number of cases.

A stimulating dose of tetanus toxod had been administered to all American soldiers prior to admission. Most of the Chinese had received 1500 units of tetanus antroxin. Those who had not previously received it were given antitoxin at the hospital. No case of tetanus developed. Gas bacillus antitoxin was administered prophy lactically in a few selected cases.

In summary, it is our opinion that the follow ing factors are of greatest importance in the early management of these cases (a) treatment of shock and hemorrhage (b) thorough wound debridement (c) local and oral sulfonamide therapy (d) adequate immobilization and (e) rapid evacuation to a fixed installation. Fracture reduction and maintenance are of secondary importance. These are functions of the fixed medical installations.

### CONDITION ON ADMISSION

General Although all the patients presented some degree of anemia and malnutrition and showed the effects of exposure only 18, or 22 per cent, were thought to be in poor general condition This latter group consisted chiefly of patients with wound infection especially by gas-forming organsms, and patients with septic arthritis of the knee joint. The average hemoglobin determina tion in the entire group was 9 7 grains the white cell count averaged 10,000. There were, of course, wide variations, the hemoglobin being as low as 4.5 grams, white count reaching 26,000

Wounds It was not always possible at the time of admission to determine which wounds were "infected. In our earlier cases there was a tendency to postpone inspection of the wound as long as possible in order to avoid contamination. It was later realized however that the usual enteria-fever rapkl pulse, leucocytosia, and general appearance—were not always rehable indications of infection, especially infection due to gas-forming organisms. As our experience increased we tended to inspect the wounds earlier and upon slight suspicion. On the other hand it is conceded that wounds which appear super fidally infected on initial inspection may heal without complication if undisturbed We feel that the error of omission is the more senous. The average period before wound inspection was 4 days in the entire series, but the large number of immediate or 24 hour inspections was offset by one case in which the wound was not examined for 8 weeks. It was felt that once we could assure ourselves of the appearance of the wound and the adequacy of the debridement subsequent dressings could be kept at a minimum.

There were 2 instances of massive gas gangrene and 3 of gas cellulatis. Otherwise there were no patients with spreading soft tissue infections, invasive cellulitis, or lymphangitis. A large number of wounds contained superficial necrotic material, and many showed evidence of surface infection. A few wounds had been plugged with vaseline gauze and spreading infection was un

doubtedly prevented by prompt removal with release of dammed up blood and exudate. The first inspection of the wound revealed evidence of deep abscess formation in 4 instances. Secretions from the wounds were not routinely cultured.

In wounds which had penetrated the knee foint there was a high incidence of infection. Of 8 such cases, a developed joint infection and these were the sickest patients of the group and the most difficult to treat

We believe that early inspection of thigh and knee wounds following admission to a fixed in stallation is a good general principle if the initial tollet of the wound has been carried out elsewhere. Gas injection can be discovered at the earliest possible moment, a secondary débridement can be done if the primary operation was inadequate deep soft tussue infection can be controlled by early drainage and the form of subsequent treat ment can be more readily determined. Afterward if the wound is satisfactory minimal frequency of dressing is advisable

Metallic foreign bodies were noted in the wounds by roentgenologic examination in 33 natients so per cent many of them multiple.

Fractures It has been a common observation that in gunshot fractures of the long bones there occurs very marked comminution and frag mentation but it is generally noted that the classical bone displacements do not occur. This series of cases however was rather consistent in demonstrating the typical displacements of the fragments. In the upper third the proximal fragment was commonly flexed abducted and externally rotated. In fractures of the middle of the shaft, there was usually a slight amount of flexion of the proximal fragment. The lower third fractures almost invariably presented posterior displacement of the lower fragment due to the pull of the gastrocnemii. Approximately 80 per cent of the fractures in this senes were in poor position upon admission to the hospital. Since they were received relatively early this fact played little part in the ultimate results.

Associated injuries Circulatory embarrassment is one of the gravest causes for concern in the management of these patients. It is significant to note that in o cases, II per cent, there was evidence of impaired circulation of the extremity Most of these occurred in nonpadded plasters and when the plaster was split constriction was noted usually at the calf Except for 2 cases of gas gangrene which resulted in death the circu lation returned to normal following the splitting of the plaster through its entire length. We found hypesthesia and hypolgesia to be the usual early

wire through the lower feature. Anterior angula tion usually occurs this can be promptly our rected by placing the wire through the tibus, rected by placing the wire through the joint as a result of tibul traction in only 2 cases (Fig. 2). The wounds in both of these patients were severely infected with no hope being held for sub-

sequent joint motion. The most difficult deformity to correct in lower femoral fractures was persistent posterior angulation. This often could not be overcome by flexion of the knee or by manipulation. It was found that, with the wire through the tiblal tubercle, the hinge of the Pierson attachment at the fracture site instead of at the knee, and with both the line of traction and the tibia maintained in the horizontal position, the posterior angula tion was readily corrected (Fig. 2) This was the only type of case in which the line of traction was not made parallel with the shaft of the femur. It is important to maintain a firm support beneath the site of posterior angulation. A well padded Cramer were splint placed on muslin alines and bent to the desired curve readily serves the purpose. The area must be carefully watched for signs of pressure irritation.

In fractures of the middle and upper thirds, the wire was inserted through the lower femur at the function of the shaft and condules and halfway between the anterior and posterior surfaces. We feel that control of the lower fragment is best obtained by the lowest insertion of the wire that can be accomplished without penetrating the knee joint. Placing the wire through the femur has the added advantage of permitting knee joint function at an earlier date. In fractures of the proximal third marked flexion and abduction of the thigh are usually required in addition, ex ternal rotation may be necessary. Middle third fractures require very little thigh flexion. In cases with knee joint infection, flexion of the knee was limited to 5 degrees in order to avoid per sistent flexion deformities

Satisfactory length and alignment were obtained by these methods in almost every potent admitted within y weeks of the original injury Only an occasional manipulation of the fragments under aneathesis was required.

When the wire had been inserted through the femor passive knee motion was begun at the end of 8 weeks. A rope and pulley arrangement was fastened to the end of the Person knee piece, and the patient was able to control the motion of his knee within the limits of comfort. Thial traction cases obvoorally did not have knee motion until the wire was removed.

Skeletal traction was continued until there was roentgenologic evidence of bone union. Union occurred on an average in about 12 weeks. The were was then removed and the patient maintained in suspension for an additional a weeks. during which time knee and hip motions were encouraged. Most of the American patients were immobilized in plaster at this point and sent by plane to the Zone of the Interior The Chinese patients were kept in bed for an additional month and received daily massage and active and passive motions of the extremity Quadriceps exercises were stressed from the beginning of treatment. Guarded weight bearing was per mitted only after 18 weeks, but it was impossible to control many of the Chinese patients, some of whom becan to walk at the end of the 14 week suspension period. Several refractures were the result of early weight bearing and these delayed convalence considerably. No leg braces were available at this time.

available at this time.

There were remarkably few complications resulting from the ware traction. There were no soft tissue or bone infections at the sate of the wires. Only one wire snapped, and this occurred at the end of 12 weeks traction. Three tibust wires pulled out into the soft tissues and had to be replaced. This accident was caused by too superficial insertion of the wire into the tibula tubercle. In one case the traction bow became loose from one end of the wire, and the ware was pulled out through the other side by the weights. This occurred at the end of 8 weeks, and there were no ill effects, further traction beng unnecessary

Residual stiffness of the knee was a problem in many cases. It is impossible to determine which cases will develop this stiffness length of immobilization is not the only factor. Personal variation in the willingness of the patients to co-operate, their ability to tolerate discomfort and their desire to get well, are qualities of major importance. Early active and passive motion of the knee is certainly to be encouraged. Phytucal therapy, must be regular and intensive. Gradually increasing manipulation of the knee by the physical therapst with the patient proper and the fracture site supported, was useful and did not produce any untoward results.

Forceful manipulation of the knee under austhesia however was disappointing. Tears of the quadriceps mechanism were produced in a case, which further delayed the patients convolvence. Even when improvement in knee motion was obtained, it was always fleeting since increased postoperative disconfort milliated against the patients a maintaining the increased range of



Fig. 1. Widening of the knee joint due to traction through the tibial tubercle in a supracondylar fracture with septic arthritis.<sup>1</sup>

motion. In several cases the result was a poorer functioning joint than before the manipulation Wedge plasters were more productive of beneficial results. In cases with limited flexion a circular plaster was applied from ankle to groin and muslin hinges were incorporated in the plaster on either side of the knee. An elliptical window was removed from the plaster behind the knee and a transverse incision was made in it anteriorly. Each day the anterior opening was enlarged by blocks of wood and the range of flexion gradually increased. Care was taken to extend the knee completely each day before in creasing the wedge in order to avoid the possi bility of ending with a knee which had increased flexion but could no longer be extended. In the reverse situation when there was limitation of extension with consequent faulty weight bearing wedge plasters were also helpful the window being placed anterior to the knee and the joint gradually extended

### COMPLICATIONS

Thrombophicutis The diagnosis of thrombophichitis was made in only 2 instances. One of the deaths was shown at autopsy to be due to a pulmonary embolus secondary to a thrombo-

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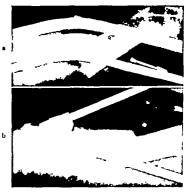


Fig. 2 a Marked posterior angulation of fracture of distal third of femur. Persistent def mitty on Braun Boebler splint b Satisfactory alignment obtained by placing joint of Plerson leg attachment under the fracture and making fraction in the line of the Usa.

phlebitis of the pelvic veins on the side opposite the femoral fracture and associated with an osteomyelitis of the ilium. The other instance was diagnosed after the patient became ambulatory when swelling of the leg was noted and palpation revealed definite evidence of a thromlosed femoral year.

Secondary hemorrhage Secondary hemorrhage was noted in 4 instances, 5 per cent. One occurred 3 days after injury. At operation a popliteal\_ artery which had been severed in battle was found. Gas gangrene not recognized previously was also discovered at operation and necessitated amoutation. The patient died within 12 hours probably from toxemia since blood loss was minimal. Two cases had wounds involving the femoral arters which bled 6 and 10 weeks respectively after injury. In both cases the artery was ligated and satisfactory collateral circulation was established. The last patient of this group did not bleed until 16 weeks following injury At operation a false aneurysm of the femoral arters was found. This was repaired but subsequent amputation below the knee was required because of deticient circulation. It is interesting to n te that in all 4 patients, the ankle pulses were Julnable on admis isn and that the circulation at that time seemed a lequate. Secon lies hem r



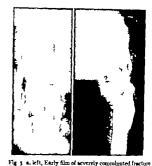
Fig. 3. a, left, Comminuted fracture of middle third of femur with multiple metalise fragments. b, Same case at 2 necks. Typical example of low grad localized onteomyelitis with sequestrum.

rhage was always considered an absolute indication for immediate exploration of the wound.

Refracture In 6 patients 7 per cent refracture occurred usually following some minor trauma. One developed while the patient was still in traction during an epileptic science. These patients were treated either by plaster firation or reapplication of wire traction. Five of them obtained eventuals bone unlon and the sixth was returned to the Zone of the Interior before this could be determined. Of the 6 refractures, 5 were in patients having definite bone infection. We feel that we erred in applying the same criteria for length of immobilization in the bone infection cases as in the clean cases. The former should have been given a longer period of fixation.



Fig. 4. Nonumion due to very marked loss of bone.



with marked bone loss. b Film taken o months later shows solid bone unson.

use of leg braces might have prevented some refractures, but they were not then available.

Bose rejection Bose milection of some degree developed in 23 patients, 28 per cent. Under associated with septic arthritis of the knee this was not a difficult problem. Bose union eventually occurred in all but one who had massive bose loss. His case is discussed later Of the 22 remaining cases only 2 showed significant delay in hone bealing as shown rontemological.

With one exception which was diagnosed by persistent drainage and the operative removal of a sequestrum these cases showed x ray evidence of localized cateomyelitis. The films did not reveal in any instance a spreading type of bose infection. In no case did a metastatic abscess develop Figure 3 is a typical example of the minimal type of bone infection which was encountered. It is possible that the local and general use of the sullonamides has modified the course of the bone infection as shown clinically and by films surely no very senous infection was observed.

The only operative procedure which was, we considered, indicated in these bone infections was incision and drainage, with or without sequestrectomy. Often this was done in the ward with the patient still in traction, usually under pentitual anesthesis. Posterior drainage by counter incision is very important, and the possibility of gravitational absecus must be kept in mind.

A draining sinus was the only persistent abnormality in this group Sometimes it remained as

long as 10 months and it is certain that some of these patients will require further surgery

We have analyzed the various factors which might concervably influence the occurrence of infection. Among these factors are anemia the presence of metallic foreign bodies, the interval which elapsed between injury and débridement. and coincident penetration of the knee joint. As almost all patients had debridement and sulfons mude therapy it was difficult to assess their value in the prevention of infection except by impresson When the other factors are tabulated it is found that, with two exceptions there is no significant difference between the cases in which injection developed and those in which it did not. The average hemoglobin level on admission was 11 grams in the cases which remained free of infection and 7 grams in the infected cases. This emphasizes the importance of early replacement of blood loss by whole blood transfusions. Second. when the fracture communicated with the knee joint the likelihood of bone infection was in creased threefold. It is our belief that the adequacy of the débridement is the most important single factor in the prevention of infection It would appear from our data that the golden period for débridement has been extended by the use of the sulfonamides, since we found the incidence of infection in the patients débrided less than 12 hours almost identical with those débrided more than 12 hours,

Septicemia In all cases with prolonged febrile course or severe toxicity blood cultures were taken, but in none was there evidence of septicemia. In none could the diagnosis be made on clinical grounds.

### RESULTS

Mortality There were 4 deaths in the group an overall mortality of 4.0 per cent (Table I) Two were from diseases not directly related to the fractured femurs. One patient was found on admission to be suffering from a severe dysentery and died from peritonitis secondary to perforation of ulceration in the colon of unproved etiology At autopsy no infection at the fracture site was found. The other died of pulmonary embolism following a sequestrectomy done for osteomyehtis of the pelvis on the side opposite the femoral fracture. The 2 remaining patients died of gas gangrene. Both of these had amputations which were performed too late. Earlier operations might have saved both lives. One arrived in a plaster spica 2 days after injury The seriousness of the infection was not recognized until 24 hours later when a mild secondary hemorrhage demanded exploration of the wound. The other

### TARIF I -- PESTITES

TABLE L-RESULTS		
r Mortality	No.	Pi Ct
a. Pulmonary Embolism	I	
<ul> <li>Bowel perforation</li> </ul>	I	
c. Gas gangrene	2	
Total	-	
s Amputations	•	•
a. Gas gangrene	2	
b Arterial injury	ī	
• •		
Total	3	3
3 Bone union (of 74 cases)	71	96
4. Functional results (of 67 cases)		_
a. Good	45	67
b Fair	16	24
c. Poor	6	0
5. Cause of results other than good		
a. Stiff joint		
Hip Knee	2	
Knee	9	
Total	11	
<ul> <li>Shortening and angulation</li> </ul>	4	
c. Nonunion	3	
d. Scattle nerve injury	4	

arrived 7 days following a perforating bullet wound which had not been débrided. A transfusion given in preparation for operation resulted in a severe hemolytic reaction with chill, prolonged hypotension and subsequent jaundice hemoglobinums, and oligums. The only chance for saving this patient was lost by waiting for recovery from this reaction rather than operating immediately. When operation was performed 4 days after admission, he was in such poor condition that the result was inevitable blood transfusion should have been used as an adjunct to operation rather than preparation for it

Amputations. Two of our 3 amputations were performed because of gas gangrene. The third followed repair of a false aneurysm of the femoral artery. The latter patient made an otherwise uneventful recovery.

Bone smion Of the 78 patients who lived there was one amputation, and 3 patients were transported to the Zone of the Interior before the end results could be determined. Of the 74 remaining cases, 71 or 96 per cent showed clinical and cases of nonunion had massive loss of bone (Fig 4). In the other instance, a clean case, the cause was unexplained. While the great majority of fractures united in from 12 to 14 weeks some were observed for 8 to 10 months before we were satisfied that union was secure. There was sur prisingly satisfactory union in several cases with marked bone loss (Fig 5).

Functional results American patients were returned to the States too early to judge the

functional results. The Chinese however were kept in the hospital long enough for us to estimate with reasonable accuracy, their degree of functional recovery. There were 3 deaths in this group and, of the 67 remailing patients, 45 or 67 per cent, had good functional results. In 16 or 24 per cent the result was only fair and in 6 or 24 per cent it was definitely now.

The chief cause of unsatisfactory results was resultated at liftness of the joints, especially the knee. There were 11 such cases. Shortening angulation and nonunion accounted for an additional 7 cases, and 4 patients had sciatus nerve injury.

### SHULLING OF IMPORTANT POINTS

An intensive study of 82 guishot fractures of the femoral shaft incurred in action in the North Burma campaign of 1943 1944 revealed the following points worth, of emphasis

- 1 The function of the forward surgical groups is the treatment of shock and hemorrhage adquate debridement of wounds, institution of prophylactic chemotherapy immobilization of fractures, and early evacuation. Definitive treat ment of fractures should be reserved for the fixed installations.
- 2 In the prevention of infection the most important single factor in the early treatment of wounds is the adequacy of the débudement.
- 3 A spice plaster is a satisfactory method of temporary immobilization. Nonpadded plasters should not be used but if used by necessity, they should be split through their entire length before transportation.
- No ankle or instep hitches should be used in connection with Army leg splints.
- 5 Early inspection of the wound at the fixed medical Installation is advisable to rule out infection, especially by gas-forming organisms. Afterward dressings should be reduced to a minimum.
- 6 Incison and draining should be instituted early when there are knee joint infections or deep subfascial abscesses. Dependent counter inusions are necessary
- 7 Circulatory impairment is serious and not uncommon. It must be recognized early and the cause eliminated.
- 8. Anemia, malnutrition, and the effects of exposure must be combatted. Early replacement of blood loss by whole blood transitusion improves the general condition of the patient and helps to neevent infection.
- Balanced skeletal traction suspension is a very satisfactory method of treating these patients in a fixed installation.

- 10. When traction suspension is used, the possibility of gravitational abscesses should be watched for and early dramage should be accomplished.
- 11 Kirschner wires through the lower femur and upper tibla proved very saturfactory and there were no untoward effects. Each location has its advantages for certain types of fracture. The wires should be changed from one location to another when indicated.
- 12 Posterior angulation of lower temoral fractures can be corrected by placing the wire through the tibial tubercle and making traction in the line of the tibia instead of the femur
- 13 Repeated roentgenologic examination is essential in treating these cases by traction suppension. Overnall must be avoided
- 14 When there is associated knee joint in fection, flexion of the patient s knee m the traction suspension apparatus should be limited to 3 degrees.
- 15. Traction should be continued until there is reentgenologic evidence of bone union. The average time for bone union was 12 weeks. Knet fount motion should be encouraged after 8 weeks.
- 16 Forceful manipulation of the knee is of no value and may do harm. Wedge plasters, how ever are of considerable assistance in the relief of persistent foint stiffness.
- 17 Secondary hemorrhage from a wound, however slight is a positive indication for immediate exploration.
- 18 Refractures usually heal but convalercence is considerably prolonged thereby Ps tents with precarious union abould be kept in suspension for an added length of time. After ward leg braces should be used when they are available.
- 19 Bone infection did not predispose to norunion, nor did it significantly delay the time of bone union as seen on the roentgenogram. However refracture in these cases must be avoided ba longer period of immobilization than in the clean cases.
- 20. The ostcomychtis seen in our cases was localized minimal, and easily controlled. It is possible that it was limited by the use of sulforamickes.
- 21 Retained metallic foreign bodies did not appear to predispose to bone infection.
- 22 There was a mortality of 4.9 per cent. Bone infection of some degree was noted in 88 per cent. Bone union occurred in 96 per cent of the survivors. The known functional end-results of 97 followed cases were good in 67 per cent, faur in 24 per cent and poor in 9 per cent.

# THE DIAGNOSIS OF ACUTE FLEXOR TENDON TENOSYNOVITIS

WILIIAM R MOSES M D Washington D C

THE greatest difficulty in the care of infections of the hand is the diagnosis and differentiation of the types. This statement was made by Kanavel who also remarks concerning tenesynovitis. This type of infection is much more difficult to recognize (than lymphangitis) and the surgeon is often in doubt as to whether he is dealing with a lymphangitis or a tenosynovitis. He might well have added or both.

Thus does one of the fathers of hand surgery express the uncertainty of exact diagnosis in many cases of these grave infections. However the correct treatment of tenosynovitus is surgically the exact opposite of that of simple lymphangitis and allied conditions of the hand therefore an exact diagnosis must nonetheless be made if the indifferent results so often attending the care of these infections are to be improved Irreparable damage is the penalty for late or faulty diagnosis.

As outlined by Kanavel, the cardinal signs and symptoms of acute tenosynovits are (z) exquisite tendeness over the course of the sheath limited to its distribution (2) the semiflexed attitude of the finger (3) exquisite pain on extension and (4) symmetrical swelling of the entire finger

Several difficulties, however may and do detract from the specificity of this syndrome. An analysis of these signs reveals that they are not pathognomonic either singly or in combination This may be demonstrated clinically by expen ence or by logical scrutiny. The first sign of ten derness limited to the sheath is camouflaged by the frequent association of tenosynovitis with such additional lesions as dermatitis cellulitis lymphangitis burn or other trauma or hema toma Furthermore, there is an occasional case encountered in which only a part of the sheath is involved as mentioned by Cutler Second the semillexed attitude is that adopted by patients with any acute disease of the finger because this is the position of rest for the part. Third the pain on extension is as characteristic of cellulitis or lymphangitis as of tenosynovitis because either Berion or extension of the digit will result in a distinct distortion of the soft parts inducing pain

From the Surgical Service of the Gallinger Municipal Howital.

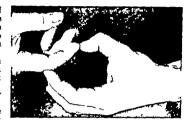


Fig. 1 Actual flexion of involved finger is prevented by the engagement of the nall of the finger in the thum had of the examiner. Attempted flexion produces pain along the paimer aspect of the finger in the presence of acute tendon sheath infection.

when these are tender Finally symmetrical swelling is found usually in simple lymphangitis.

There remains, however a method of examina tion which is a more direct approach to the tendon sheath This test may be practiced in the follow ing manner as illustrated. The nail of the in volved finger is engaged in the thumb nail of the examiner in such a manner that actual flexion (and thereby compression of the soft tissues) is not allowed. The patient is then asked to at tempt flexion of the member. It will be seen in the accompanying photograph that the examiner's forefinger may be used to steady the dorsum of the finger. In the presence of acute tendon sheath infection acute pain is expenenced along the palmar aspect of the finger due to the bow string like tensing of the tendon against its sheath Pain is consistently absent in infections involving the soft parts alone

The author has used this test of differentiation in 23 consecutive cases of acute tenosynovitis simple and complicated by other lessons as above mentioned. It appears to be a specific test

### REFERENCES

- r Curran, C. W., Jr. The Hand. Philadelphia W B Sannders Co., 1942
- 2. KAMAYEL, ALEN B. Infections of the Hand. Philadelphia Lea & Febiger 1943





as Ballon

## **EDITORIALS**

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## ALBERT D BALLOU AN APPRECIATION

HE initial issue of SURGERS GYN ECOLOGY AND OBSTETRICS was published on July 1 1905 with 600 paid subscriptions registered and a leading article written by Nicholas Senn The trials and tribulations of the initial issue of the Journal have been written by Dr Franklin Martin As the Journal increased in popularity and number of subscribers it became certain that a man with a knowledge of printing and bookmaking must be chosen as General Manager Many young men applied for the position, Albert D Ballou was chosen This was in 1007

Educated in Iowa the son of a Methodist minister and trained for a career in journal sim, Mr Ballon has occupied the position of General Manager of the Surgical Publishing Company of Chicago for the past 38 years His modesty loyalty business sagacity and ability to build an organization which has been relded together through the years by a spurit of friendliness, co-operation, and mutual

respect have played a large rôle in the success of the Journal. He and his associates have been completely responsible for the format of the Journal. Its attrictive appearance and the high standards of its advertising material. The wisdom of his judgment and the clearness of his vision are reflected in its pages.

To Mr Ballou Dr Martin gave the task of organizing the mechanics of the first Clinical Congress of Surgeons in 1910. With each succeeding Chinical Congress even after it became a part of the activities of the American College of Surgeons in 1913, he has discharged his responsibilities with great credit to himself and to the College of Surgeons. His meticulous duffillment of tasks given to him regardless of their magnitude or their relation to his primary responsibility has always enlisted the profound admiration of his colleagues. Few laymen have such an extensive friendship among the surgical profession as he has

The Board of Regents of the American College of Surgeons and the Board of Directors of the Surgical Publishing Company as the time approached for his retirement desired to record their appreciation of his invaluable service and to congratulate themselves upon the fact that his judgment and advice will still be available to them. It is their hope that the esteem and regard in which they hold him and their deep appreciation of a task of great magnitude well done will give added pleasure to his enjoyment of the future

Som abell

Chairman Board of Regents, American College of Surgeons Chairman, Board of Directors, The Surgical Publishing Company of Chicago

## STRICTURES OF THE COMMON DUCT

TRICTURES of the common duct have always been a great problem to surgeons because results of repair have been so poor and their causation is usually related to an operation on the bile tract. In a study of patients with stricture Cattell noted a relationship to operative trauma in about 80 per cent of cases and Walters in 90 per cent of cases. In a study made recently at Illinois Research Hospital such a relationship was present in 76 per cent of cases?

It is no doubt true that in many instances the damage may have been done by infection or an abscess and not by actual traums. Nevertheless there are so many instances in which actual section or ligation of the duct can be proved that it behooves all surgeons working on the billary tract to take extra precautions for safety of the ducts during operation upon the billary system.

From the standpoint of treatment the lesions can be divided into four major groups (1) local stricture which can be resected with primary anastomosis (2) stricture of the ter minal end only allowing transplantation of the proximal stump into the pylorus or duodenum (a) stricture of the proximal portion allowing preservation of the sphincter of Oddi and (4) destruction or stricture of the entire duct Repair of the first two types is comparatively simple and results will be good if certain pit falls are avoided For example in group s it is desirable to do the anastamosis over a rubber or vitallium tube but if a T tube is used it must not be brought out through the repair line but through an incision in the duct distal to it In group 2 reformation of a stricture will be prevented to a great extent if "Cult W H Ireacus, Corl, and Reynolds, John. Ann. Surg (In proof).

the mucosa of the common duct is anastamosed directly to the mucosa of the intestme (Cattell) In groups 3 and 4 the vitallium tube as introduced by Pearse can be used to advantage Search should always be made for the distal end of the common duct since the sphincter of Oddi is such a valuable factor in prevention of regurgitation of intestinal contents into the bile ducts. It is difficult to explain the mechanism of production of the stricture in group 4 and particularly the high frequency of this type We have been unfor tunate in finding an unusually large incolence of this type at Illmois Research Hospital. encountering this type in over half of 24 cases of inflammatory or traumatic stricture. If search is thorough one can usually find the terminal duct or its remnant. We have not found incusion into the duodenum for visual unation of the sphincter of Oddi to be of much value to us. In almost all of our cases in group 4 we have found either a duct too small for function or one entirely obliterated. In view of multiple observation on a few cases, we are convinced that this obliteration can be grad ual and can be produced by infection and disuse

Because of the frequency and difficulty in repair of group 4 we have devoted most of our attention to this group. We have treed anastamous to the duodenum or pylorus of the stump of the duct at the hilus of the liver with so many failures that we have abandoned it. All patients repaired after this fashion do well for 6 months to 2 years, but ultimately all except one or two of ours have returned with senous symptoms of recurrence of the stricture.

For this reason we began the use of a vitalhum tube to bridge the defect but did not think it would be feasible to transplant the tube into a loop of intestine which was functioning theoretically the food stream would dislodge the tube. We accordingly adopted the principle of anchoring the tube to the stomp of the duct at the hilus of the liver with a pursestring suture, and inserting the tube into a defunctionalized loop of jejunum In 5 cases we inserted the tube into a loop of winnim, the arms of which were anastamosed hoping to shunt the food away from the tube thus minimizing possibility of regurgitation of food and intestinal contents into the intra hepatic ducts To our surprise in the 4 patients who survived this operation, the food stream continued to flow through the arm of remum All a patients developed cholangitis with chills and fever, which was fatel to one Two of the three remaining had the proximal arm of sejunum severed and valves made in the distal arm. These two patients have had complete freedom from chills and fever, indicating that regurgitation of food was the primary cause of cholangitis

Having had poor results with the use of a loop of jejunum we later adopted the use of a defunctionalized arm of jejunum utilizing the Roux principle. We have operated on 7 patients after this technique. This method is similar to one recently reported by Allen except that he used a rubber catheter instead of a vitalium tube and made no valves to prevent regurgitation. All 7 patients survived this operation but one died 2 years after operation with Banti's disease, which we assume to be entirely coincidental. All 6 patients surviving have had excellent results 2 or 3 of them having had one or two mild chills early in their convalence.

We obtained such definite evidence of the role of regurgitation of food into the intrabepate ducts in the development of cholang its that we have arrived at the conclusion that 2 or 3 valves created by infolding of the intestinal wall (or equivalent method) should be placed in the arm of jejunum to prevent regurgitation and that at least 18 inches of jejunum should intervene between the anasta mosts at the hilus of the liver and the end toside anastamosts of the jejunum

On two occasions x ray observation at intervals has revealed passage of the vitallium tube after a few months However, both of these patients have remained entirely well In these cases at least the value of the tube could have been nothing more than temporary Nevertheless we are convinced that a temporary support of some type is absolutely essential for a few weeks, to maintain an opening and prevent shrinkage or possibly a true stricture at the function of the hilus and arm of rejunum It appears logical to assume that if the open ing was small or stricture formation developed the tube could not pass on account of the flange and funnel shaped tip. On the other hand after the sutures had cut through (which we assume would happen in a few weeks with release of the tube) the tube might be passed if the opening was large enough to allow pas sage of the flange and funnel shaped end If the opening is this large after the process of healing and scarring has been complete the chance of stricture formation would appear minimal indeed. For this reason we believe that if the tube remains in place for 3 months it makes no difference whether it remains or passes, since the opening would appear sufficiently large to avoid stricture formation if large enough to allow passage of the tube after that interval WARREN H. COLE

## INTRAVENOUS AMINO ACIDS, PROTEIN DIGESTS—ACCURACY OF TERMINOLOGY

HE intravenous injection of nitrog enous substances for nutritional purposes has received widespread at tention in the past several years. It is to the credit of surgeons that as a group they have

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played a prominent rôle in the development of this field which is more closely related to the fundamental sciences than to clinical surgery In the literature concerning the practical application of intravenous nutrition with

application of intravenous nutrition with nutrogenous materials the terms amino acids and casein" or 'protein digests seem to have been employed interchangeably This is confusing especially to the chemists A solution of amino acids is just that and is prepared by addition of these acids each in crystalline form obtained synthetically or by extraction. A protein may be decomposed to its constituent amino acids but the writer is unaware of a digest generally available at this time in which this has been accomplished. The several types of available digests represent mixtures of simple peptids and amino acids. It has not yet been demonstrated that utilization of intravenously administered digests and solu

tions containing only amino acids are identical phenomena. Indeed it has not yet been deter mined which type of preparation is the most destrable

Now that the general principles have been established, it falls to the chemists further to improve nitrogenous nutriments for intravenous use. In doing this they must take cog nizance of clinical research with the several types of solutions employed. In the interests of accuracy and to facilitate a general agree ment in the manner of recording experiences. the consistent use of casein fibrin and similar terms, digest should be employed where such solutions have been used. The term amino acid solutions should be reserved for solutions composed of these acids only The terms mentioned should not be employed indiscriminately as they refer to different preparations ALEXANDER BRUKSCHWIG

## THE SURGEON'S LIBRARY

## REVIEWS OF NEW BOOKS

THE third edition of Titus Management of Obstetric Difficulties 1 like the first two editions B not intended as a conventional textbook. However it has been made more complete particular ly as regards an extensive bibliography. The emphasis on the practical nevertheless has been maintained and its aim as a working aid in dealing with obstetric emergencies preserved. Additions and changes have been made so as to bring this third edition grossly up to date For example the Rh factor and erythrobiastosis are thoroughly discussed caudal analgesia is included in the chapter on anesthesia, the tech siques of extraperitoneal cesarean section are nucely described and illustrated and penicillus therapy is completely discussed in practical detail.

Because it covers mainly the abnormal phases of chitetrics, minimizing historical and therapeutic omaderations and because it presents in a straight forward manner the practical aspects in the treat ment of these abnormal phases it should be avail able to all who may be faced with obstetric difficulties in practice or in training. It is of unlimited value to the general practitioner and to the obstetric house officer or resident. During my own hospital training the previous editions of this text were of the greatest sid, particularly in emergencies where a quick reference was needed. The author has expressly in tended this book to serve just such a purpose, consequently, he has avoided lengthy discussions of all the possible forms of therapy in any given situa-tion, and has frankly expressed his own preferences which are based upon years of chinical experience and which are nearly universally acceptable. This book is a must.

THE fourth edition of Essentials of Body Mechan us in Health and Disease by Goldthwait Brown Swaim, and Kuhns has decreased in size but has become more compact and concise while still retain ing its clarity The book is more timely now than ever since there is so much stress on physical fitness nationally The great number of rejections that oc curred in Selective Service showed the necessity for more stress on physical fitness throughout the country The need for rehabilitation of the return ing service men, as well as the great problem of cor tecting so many of the deformities and disabilities seen in civilians make this book of importance in

MALLOTTER OF CONTESTED DEFICIENTS. By Paul Thos. M.D. Place E. Louis E. V. Mody Co. Mallot and Details. By Paul Thos. M.D. Place Those of the C. V. Mody Co. Mallot and Details. By F. C. Oddherdt, M.D. F. A.C. J.L.D. Lloud T. Krows, M.D. F. A.C. J. L.D. Lloud T. Krows, M.D. F. A.C. J. Place E. C. M.D. F. A.C. J. Place E. J. Series J. B. Upplication 15 Upplication 1

this connection also Many of the deformities in adult life could be prevented by establishing good body mechanics in childhood

The advantage to the individual with chronic illnesses in the correction of body mechanics is demonstrated in several chapters of the book. In this connection the work of Kerr showing the rela tionship of the heart and circulation to body me chanics is particularly interesting. The importance of keeping the aged in good physical condition which will improve their general well being is greater since the life expectancy has been definitely increased

The chapter on the foot has been rewritten. The most common static deformity pes valgoplanus is conceived of as being a congenital defect in many instances, with the second toe longer than the first and the mechanism at the great toe more phable than normal. The treatment described is by means of a series of exercises for the foot, in sitting and stand ing positions. To protect the weak foot, such supports are recommended EMIL D. W. HAUSER.

A timely contribution to an important branch of surgery especially under war time conditions is Armstrong's Bone Grafting, in the Treatment of Fractures 3

The author a meticulous worker has excellent qualifications from the viewpoints of training assignment, experience and associations

The value of bone-grafting in the treatment of fractures is well known. In the practice of this particular branch of orthopedic surgery one inevitably is confronted by many problems and practical difficulties. This book has arisen out of the difficulties the author has encountered

In the foreword Mr Watson Iones states that the principles of bone grafting were familiar to John Hunter two hundred years ago He further states

In his monograph of bone-grafting in the treat ment of fractures Mr Armstrong's work reflects the surgical development of two hundred yearsthe research of Hunter the work of Lister the in apiration of Macewen the skill of Lane and the craftsmanship of Albee. On this very sure foundation linked to recent research in metallurgy is based a technique of bone-grafting which almost completely solves the problem of slow union delayed union and non-union. Mr Armstrong has dealt faithfully with every detail of technique that the surgeon must know As a leading member of the team of ortho-

"Bout Gearmon; in the Treatment of Fractures. By J R Armstrong, M.D. M.Ch., F.R.C.S. Balthmert The Williams & William Co., 115

STUART ABEL

pedic surgeons of which the Royal Air Force is proud surgeons who have shouldered beavy responsibility, he with them has gained vast experience and treated the fractures of pilots and aircrews which are characterized by remarkable severity and multiplicity in all their work the highest possible standard has been set, and it has been maintained by the vigilance of Osmood Clarke, a service consultant. But it has been achieved without standard ization or suppression of infittitive.

The technique of onlay bone-grafting with vital lium screw fixation is well established Brilliant results can be achieved-deformity can be pre vented union can be accelerated nonunion can be avoided. But, let it be remembered that John Hunter was defeated by sepsis. Let it be remembered that internal fixation was no more than part of the contribution made by Arbuthnot Lane notouch technique was the other part. Even today the general standard of asepses in operative technique is far too low To infect a closed fracture is a disaster of the first magnitude it is no less worthy of a court of inquiry than a railway duraster. The surgeon who proposes to adopt the recommendations of Armstrong's monograph must first achieve so perfect a command of aseptic technique that if, within a few days of operation the patient develops a febrile reaction be can say with complete confidence may have pleurisy he may have pneumonla but whatever he has. I am quite certain that he has no infection in the wound.

Armstrong believes that the onlay graft tech nique is the sumplest and most efficient. The most effective available grafts are those cut from a normal tibia. The use of metal screws is the most reliable

method of securing internal fixation. He outlines certain basic considerations such as close and stable contact between large areas of raw bore on the graft and host mechanically stable fixation of the graft and fracture before grafting the clearing of the Instituted surfaces of fibrous tissue and sciencia tissue entoration of normal apposition and alignment of the fragments of the bost bone. The architecture of the reconstructed bone as a whole should as far as possible at the conclusion of operation approximate normal.

operation approxime issuing. Subjects discussed are the principles, general indications, contraindications types, sources and fixation of grafts preoperative and postoperative treatment operative technique cutting and preparation of grafts fractures of the spine clavicle humerus, radius, ulna carpal scaphoid, metacarpals and phalanges, neck of the femur shaft of the femur, tibia, fibuls ankle tarsus and metatarasis.

Arthrodesis has been discussed in connection with certain fractures of the tarsus and spine in which he believes it to be the best initial treatment.

Most of the reentgenograms and the statistics included in the Appendix were taken from the reords of the Royal Air Force orthopedic centers. The author acknowledges the debt which he incommon with all the other orthopedic surgeons in the Royal Air Force owe to Mr Watson-Jones and to Air Commodore Osmond Clarke. He pays tribute to every member of the orthopedic team" in the center to which he is attached.

Those who will receive the greatest benefit from this book are the surgeous who have (1) the qualifications to do this type of work, (2) the interest, (3) the opportunity, and (4) adequate facilities to do it well including physical set up medical, surgical and allied personnel and equipment.

Minor criticism includes the thought that the double only graft has not been given sufficient space and illustration Some of the colored limitations are too highly colored. Some photographs are early fair like drawings would have been more instructive. However in spite of these criticisms, the book can be recommended without reservation.

Pritte Lawne.

A CONCISE presentation is made in Hypericasion and Hypericasion Discaré of the authors concepts of hypericasion and hypericasion desire with a critical analysis, almost approaching dogmatum, of many existing ideas on the genesis and mangement of these disorders. The material is well presented with considerable space devoted to functional evaluation and its bearing on the rationale of certain forms of therapy.

In the early chapters hypertension is defined and hypertensive disease is discussed. The authors consider essential hypertension as an indefinable physiologic disturbance (or disturbances) character istic of this disease which ultimately leads to cleve tion of diastolic and systolic blood pressures, and tomical changes in the vascular tree, and functional impairment of the involved tissues. They feel that in the past physicians have been too interested in the level of the blood pressure and have neglected the primary cause. After considering the factors capa ble of altering blood pressure, they conclude that the responsible agent is a generalized vasoconstriction sufficient to increase the total effective peripheral resistance. The authors tend to show that although a humoral mechanism with a superimposed neurogenic factor is generally believed to cause vasourestriction, controversial data exist which prevent this concept from being a reality

One of the control of

HYPERTENDER AND HYPERTENDERS DORLARS. By William Ociding M.D. and Herbert Chess., M.D. New York, The Computer and A. Pand

The chapter on the evaluation of the current medical and survical treatment is too critical as the anthors' criteria for evidence of cure is rigid and almost impossible so long as the cause of hyperten non remains unknown. Anything which merely depresses the blood pressure is considered artificial when no attempt is made to combat the cause Thiocyanate therapy was not recommended as it proved dangerous in their hands. They admitted that pyrocenic substances lowered the blood pressure but this was offset by the undesirable effects upon cardiovascular dynamica Renal extracts were con sidered empirical, masmuch as the authors believed that the fall in pressure resulting from their administration was probably associated with a pyrogenic reaction Nephrectomy was definitely condemned. The newer concepts of amine-oxidesis treatment were described.

The reader however is given some ideas as to treat ment for a regimen is suggested which is conservatwe and logical. The management of hypertensive complications especially in pregnancy are worthy of comment.

Appendixes are included at the end of the book which describe the technique of determining direct blood pressure measurements cardiac output, and the various procedures used for determining renal function THEODORE R. VAN DELLEM.

THE author of the volume, Radiologic Exami nation of the Small Intestine 1 because of his scentific interest and tremendous experience, is one of the few qualified to deal with this important subject. Much of the material has been presented at instructional courses at the meetings of the American Roentgen Ray Society and the Radio-lopeal Society of North America. Those of us who have had an opportunity to attend these courses are indeed grateful that the author provided the proimson with this fundamental material in the form d a book for study reference and reflection

It has only been in comparatively recent years that any time or consideration has been given to the small intestine during a gastrointestinal examina tion. In most books published on the subject of the patrointestinal tract little space is devoted to the small bowel. The author has had a wide experience a this field and has made every effort to correlate the roentgen with clinical, operative and postmor ten observations A thorough knowledge of the tratomy and physiology is paramount if one is properly to evaluate the roentgen findings and to differentiate the normal from the abnormal.

The author in his usual clear concise easily read she, and scientific manner devotes the first chapter to indications for roentgen examination technique, and the report of the small intestine study followed by a thorough description of the embryology anat ony and physiology of the small bowel. He then describes the appearance of the normal small bowel

PRINCIPLE BY ROSS COL-tes, M.D. Philodophilas J. M. Lippincott Co. 945

in the adult and the infant. Subsement chanters are devoted to organic lesions such as intestinal obstruction the use of the Miller Abbott tube in the diagnosis and treatment of fleus disorders of nutrition, diseases of the mesentery allergy inflamma tions, neoplasms anomalies the effect of food and certain drugs on the small intestine and miscel laneous conditions. All of these conditions are discussed thoroughly with due credit given to the work of other investigators. The subject matter is well illustrated with excellent reproductions in the negative phase. An extensive bibliography is a further testimonial to the author a scientific approach to the subject.

This volume written by a man well qualified and completely familiar with the subject represents a truly outstanding contribution to the literature in the field of roentgenology. It should be in the library of every roentgenologist and any physician interested in the diagnosis of lesions of the intestinal tract. The publishers are to be congratulated on the excellence of the paper the printing and the Illus trations. It is recommended without reservation.

EARL E. BARTH

'HE second edition of Clinical Roenteenclory of the Digestive Truck by Maurice Feldman's which presents a clinical roentgenological consideration of diseases of the gastrointestinal tract has been thoroughly revused and completely reset. The importance of the diagnostic value of the menteen examination is stressed throughout. The subject is handled in a lucid concise manner well illustrated with excellent reproductions of roentgenograms and artista drawings

Separate chapters are devoted to the esophagus stomach, duodenum, small intestine colon hernia, diaphragm appendix gall bladder biliary ducts liver pancreas peritoneum, omentum, mesentery and retroperatoneal tumors lymphomatous discases abdominal vessels spleen, the deficiency diseases and miscellaneous conditions. A systemat. to co-ordination and correlation of the clinical and roentgenological findings is emphasized in the decussion of every condition. The more recently described developments and methods of x ray examination have been added. A complete bibliography is provided at the end of each chapter

The author is to be congratulated for assembling such a vast amount of material into a single volume thus providing a source of accurate information on this important subject. The reviewer has found the first edition published in 1938 to be one of the most useful books in his library as an atlas for the medical students and as a helpful reference work providing a valuable and ready source of accurate information. The second edition is recommended without reservation to roentgenologists gastroenterologists students and general practitioners. The book should be added to the library of any physician

\*CLINICAL ROSTON OF THE DESCRIPT T ACT B Maurice Falkman, M.D. ed ed. Bulthoors: Williams & Wilkins Co. 945

interested in the accurate diagnosis of lesions of the gastrointestinal tract Last E. Burn.

I simple concive words the author's forty years of experience and teaching in the field of traumatic surgery is skillfully described in Clinical Transaction Surgery 1 The valuable material in Dr Moothead's earlier books-Tranmatic S gery in 1917 and T a matte Throupy in 1931-has been included and brought up-to-date by the excellent appraisal and discussion of improvements in the treatment of the injured. Chemotherapy and pennullin early mobilization Roger An lerson reduction apparatus and Stader splints a will as many other advances are con idered. The work is unusually well illustrated by photograph diagrammatic sketches many describing stages of treatment procedures such as reduction f the dislocated hip or the dislocated shoulder. The reproducts as of x ray films are not only excellently chosen but the reader can actually see the path logical condition described

The 32 chapters covering 725 pages with 500 illustrations divide the field of traumatic surgery into I gical categories in which the reader can quickly learn exactly where to find any particular type of traumatic problem discus ed. The chapters on traumatic neurones medicolegal phases of trauma compensation problem and malpractice suits reveal the author's knowledge of the importance of these subjects in all traumatic surgery treatment. The chapter on war njuries i a tipe abbreviated résumé of treatment f nar injuries including much of the author's experi ace at the Pearl Harbor attack December 7 1041 where be ju t happened to be at that time One would expect Dr John J Moorhead to dedicate this book to "The Wounded at Pearl Harbor-In recognition of their courage and stamuna and in tubute to their surreon-comra les.

The book offers an excellent opportunity for the physicians in duty in hospital receiving and examining room to tudy this beld and hould be there for ready reference. It bould also be in every indu trial medical lepartment and di pensary for treatment of th injured Since the general practition r may occa sonally or frequently be called upon to treat cares of injury the volume offers an excell at reads source of reliable information.

One game the impression of a create diag of the pages neces stated by publication of this book under war time restrictions. Future editions that are cer tain ! Ilow quickly I amoure will correct this con dity a where for example a new chapter follows the preceding charter within an Inch or two of the bot LOWARD C. HOLMMAD t mod the name

THE book The Care of the Year in great Patient by Ernest Such. \* containing r68 pages with 1.7 Manufact on Sire P Job J 3 webs 198 MD Disc PACS (SM) Homblyta With Massims Co. 81 199 Cat. The Nation to that Person in 199 Person in the Person in the Appendix 199 Person in the Person in the CA World C. 83

illustrations two in color i combilerably broader in its scope than the title suggests. It is extently written f r the enlightenment of peurosurred mternes and young residents. From thi standwitt it fulfills its mix con well. The older neurosurgeem will find much of interest whether or not they serve on minor details as the book refects the mature opinion of one of the pioneers in this comparatively new specialty However the chief function I that work is the instruction of the novice. It is filled with simple truths common sense observations and what to the experienced neurosurgron may seen trivial or self-evident facts but which to the young man without such a background are valuable directives

These are the simple instructions presented, knowledge of which we usually take for granted an i capnot understand why the inexperienced fall to make the necessary observations and carry out the indicated procedures. Suchs anticipates the maps simple complications which may arre before, dunct or after a neurosurgical operation and gives de

tailed instructions to prevent or relieve them.

The book is written in almost a conversational manner which in some places leads to verbeity The re newer at times felt the desire to condense or eliminate sentences-to get more rapidly to the essential facts

The first chapter deals with the preoperative examination and care of most neurosprencal condtions. Included is an outline of a very complete neurological examination and the special tests to be mad in the diagnosis of certain intracranial tumors Under separate headings which are carefully in dexed are suggestions for the examination and early care of patients with head injury brain tumes brain abecres neuralgia hydrocephalus social injury spanal tumor ruptured intervertebral disc. spina binda and peripheral netve lolury

Subsequent chapters deal with the operators room preparation of the patient and general opera tive procedures. Included is a discus ion of ancithesia neurosargical practices in the control i hemorrhage the use of uction, cotton, and bree wax The indicate as for and technique of ventra

ulography are given.

In a chapters are devoted to operative procedures usually with detail of illustrative ea et in which such operations were performed 6 che presenti be personal views gleaned from a wealth I restrict and years of practice as to the lest procedure f 1 & wide variety of neurosurgical condition. Perculiel these b the inesperienced interne or reduct, especially just before a list ag in the operating prowould greatly enhance his value since be wead know in general what was being done and could anticipate some of the needs of his chief. All the usual neurological surgery operations are well illustrated.

In excellent chapter deals with posterporati care a subject so often delegated t commerate h inespersenced men. Induted is the care of tMax M Prev

howeh and bladder postoperative fever the recog minon of a postoperative clot frequency of dressings, and other simple, but from the patient's standpoint, important details

A careful study of this work by the young resident staff will remove a considerable load from the neurosurreon and will undoubtedly expedite the recovery

of many patients

HE breast may well be considered the organ of romance for more reasons than one. It responds to many influences sexual maturity with its ac companying hereditary or basic variances the menstrual cycles pregnancies either going to term or interrupted lactation brief or prolonged, inter current infections pelvic desease affecting ovarian secretion, early or late in life, the menopause and subsequent senile involutional changes. The ana tomical changes in the breast due to the above minences are so varied that, in truth, it is difficult to determine accurately what is within the normal and what is abnormal when one considers evolu tional changes which might present themselves in the largest number of relatively healthy individuals The breast is an external organ therefore susceptible to fairly accurate evaluation of gross anatomical changes and with slight inconvenience material can be procured for microscopical examination. The examination of the breast is a real art that must be developed in the light of gross and microscopic studies that are properly interpreted. An answer to many of these perplexing problems may be found in the new second edition of Direases of the Breast by Geschickter t

This the second edition, follows the first which appeared a few years ago and which was considered by many to mark a milestone in monographic medi tal literature. New material has been added in this second edition chief of which is the criteria of opera bility and moperability of mammary carcinoms the relative ments of surgery and uradiation in cancer, the endocrine therapy of chronic cyatic mastitis and the etiology of mammary carcinoma edition of approximately 800 pages contains 593

illustrations and many tables

It is impossible to review adequately this work because of the tremendous amount of material it contains The basis for opinions and conclusions by the author is placed upon a study of clinical cases seen in the wards of the Johns Hopkins Hospital, a critical analysis of case historics specimens, and follow-up studies recorded in the Surgical Patholog cal Laboratory of the Johns Hopkins Hospital and experimental evidence obtained by the author in his own investigative work and that of others cluded is a description of the normal development and functional changes in the mammary gland, the endocrine physiology of the breast and the breast in pregoancy and lactation. The author seems to have Partiest or was Burner By Charles F Geschichter, M.A., M.D. Berner on treatment in collaboration with Murray M. Captured, A.B. M.D., F.A.C.3. sel ed. Philadelphia, London Montal, J.B. Haptenett, Co., 915.

simplified somewhat the subject of chronic cystic mastitis considering it as a mammary dysplasia of varying types The endocrine aspects of this condition are discussed and, what is important the possible rôle mammary dysplasia may play in the occurrence of cancer. It would appear that this latter is the prime factor since by far the largest percentage of breast lesions which are benign do not endanger the life of the patient nor do they markedly handicap the individual. It is the fear of the presence of cancer or the possibility that the lesion is the forerunner of cancer that distresses the patient In consideration of this association between chronic cystic mastitis and carcinoma the author states in the preface of this second edition 'The incidence of carcinoma in chronic cystic mastitis (less than three per cent) has been supported by additional statistics and the importance of endocrine factors in the etiology of benign and malignant mammary neo-

plasms has been extensively confirmed.

Many pertinent facts are presented in the discussion of benign mammary tumors in the light of estrogenic stimulation. In 328 pages devoted to a complete consideration of cancer of the breast ref erence is made again to the importance of recog mixing a thorough radical m. stectomy as the treat ment of carcinoma of the breast in the so-called operable stage. One point the author brings forth is difficult to comprehend. In advising irraduction after radical mastectomy when axillary nodes are present, he states that there is about 5 to 7 per cent increase in the 5 year survival over that procured with only the radical mastectomy. It would seem logical to conclude that by far the largest percentage of deaths due to carcinoma of the breast are the result of distant metastases such as to the viscera and not to purely local recurrences. The question involved is whether such fatal visceral metastases are the result of local recurrences or whether they were present or took place at the time of the radical mastectomy If the former then postoperative ir radiation might be of benefit but if the metastases were present at the time of operation irradiation will be of no final benefit. Serious consideration must be given to events that may occur when the patient is examined while the diagnosis is made such an excessive manipulation of the breast, thus spreading the disease and possible spread during the operation.

The experimental evidence on production of mammary dysplasias and tumors including card nome is extremely interesting. One cannot escape the conviction that the promiscuous administra tion of hormones especially the estrogen group may have potential dangers. This warning may be timely now when there seems to be a trend to give women estrogenic substances for so many resistant conditions and complaints that do not yield to commonplace therapy

The author has without doubt accomplished his purpose which is well expressed in the preface to the first edition. In recent years contributions to the

etiology the diagnosis and the treatment of mam mary disease have accumulated rapidly. Much of the progress made can be attributed to the different groups of special is interested in these problems The specialties concerned include surgery, radiology obstetrics and genecology pathology endocranology and laboratory technology. In bringing together in this volume the work done in these diverse fields the usefulnes of this information to the general practi-

tioner as well a to the specialties enumerated has been the foremost in mind." In this volume there is placed at the disposal of the practitioner an en-r mou amount of information that he must have if he expect fully t comprehend his responsibilities and escape the pitfalls before him when diagnosing and treating diseases of the breast. The man excellent illustrations add much to the text.

TORY & WOLFTE

## BOOKS RECEIVED

Books received are acknowledged in this department. and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be mad, for review in the interests of our readers and as space permits.

A Tryrnook or Schorky By American Authors. Edited by Frederick Christopher B.S. M.D. F.LC.S. 4th rev. ed. Philadelphia and London W. B. Saunders Co., 045

I THILOGY OF TROPICAL DISPASES AN ATLAS BY J F Ash, Colonel M C. U.S L, and Sophie Spitz, M D A U.S. Philadelphia and London W. H. Saunders 1045

A MA THE OF STREET ANATORY Prepared under the Auspices of the Committee on Surgery of the Division of Medical Sciences of the \ tional Research Council. By Tom Jones and W. C. Shepard. Philadelphia and London W. R. Saunders C. 1945.

ANTERATION PROSTILLAS ANTERANCE AND PRESIDENCE CONSIDERATE VIN WITH PRINCIPLES OF ALICAMENT AND FITTING DIAMOND FOR THE SCRIPPON AND LINES MANC FACTURER. By Atha Thomas, M. D. F.A.C.S. and Chester C Haddan Philadelphia, London Montreal J B Liprincott Co., 945

CIFFE I MATE AND SPIFER By Muriel E. Morky B Sc | C S.T Baltimore A William Wood Book. The

W Biam & Wilkins Co tors

THE OAS YEAR BOOK OF REDICTION DESCRIPTION Idited by Charles A. W. 1 rs. M. D. and Whitmer B. From M. D. Transarturiera. Idited by Ira. I. Kaplan, B. M. D. Cherago The Year Book Publishers, Inc.,

IN TOMITYM ACTUAL DE LAS MEMBAS CINCOLA SCUPA MINISTERNICITE A By Pedro D Curatchet, Buenos Aires

MINISTRUCTURE AND A STATE OF THE STATE OF TH foreword by H kn Young, LN Philadelphia Lea & Febreer out.

STUDIES ON PROTEIN METABORISM IN THE CRIES OF Letterratus Terrocus. By Torbjörn Caspersson and Lat-Santeson Stockholm Kungl. Boktryckenet. P A.

Norstedt & Söner 942

EXPLANENTS WITH MANNALLY SUCCESS EXPLICES IN REGIED TO CYLL FREE TR SMISSION AND INCOME TUMOR IMMUNITY FURTHER STUDIES OF THE KRIS Rase Africane, Wanter Statemen, By Carl Krein, Ottat Thordamon & Johannes Harbo, Aarhus Aarhus Kon-munchospatals Routgen & Lysklinik Og Radiumstationes For Jylland, 1942

THE VALUE OF THE BARROW EVEN BY THE DRAWS AND TREATMENT OF EXTENSION OF CHILDREN Illustrated by bout Fire Hundred Danish Cases, By Jens Munck Vondentolt, Copenhagen Einar Merki-

gaard, 1943

URETHR SCHEROGRAPHY IN THE MALE THE SPECIAL REGUED TO MICTORITIO By Vilk P G Eding tock holm Kungl Boktryckeriet. P L Norstedt & Norr 1045-

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# International Abstract of Surgery

Supplementary to

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COSDS.

I ruposed prophylactic treatment consists ( calucation of the latity and the profession to lead to early disgnoss and conservative treatment. Clean linear should be advocated and prevention of undue chronic skin mriation especially prevention of carcinogenic exposure in industry under the super vision of industrial surgeous

The differential diagnosis includes syphilis (especially tertiary lesions) mycosis fungoides leprosy leishmanisats, skin tuberculosis, Hoeck a sarcold lupus crythematosus, and lupus verru

Treatment consisted of a routine in which op per cent of the cases were referred to surgery and to per cent for radiation alone. Biopsy of large but not obvious carcinomas was practiced small leasons were excised for biopsy. In the author's clime er cision gave prompt and often superior results as compared to radiation expecially when the late effects of radiation skin atrophy and telangiec tasies are considered. He did not believe that radiation therapy was successful despite some excellent late results in the cases in which bone or

cartilage were involved. Painful cases when in operable or when the patient had an uncontrolled systemic disease or was of an extreme old age with cardovuscular disease, were referred for radiation. Less extensive cardonoms involving only the soft tissue were also referred for radiation. Surgical high-frequency currents were used for desicoation until all the lesion was removed when

the lesion did not exceed 5 mm. Inexperienced use of the high frequency current often resulted in deep and indolent ulcerations. Radium after electro-

desecration is not thought necessary

Adequate surgical resection wide of the tamor is the treatment of choice. Special problems exist in the case of lesions of the nasolabul fold in which involvement of the nasal cartilages or ethmoid or maxillary sinuses as frequent, and in the case of leasons of the ear in which early metastases to the regional lymph nodes are seen. Results in such leatons are not always favorable except in very amell early lesions unless radical procedures are followed In the more advanced or recurrent lesions extremely wide excesson and electrocoagu lation is preferable and it is often successful after simple surgery or radiation has failed Novocaine block and local infiltration is the preferred type of anestheria no spreading of the tumor by the needle was observed.

When possible, immediate reconstructive procodures were done, even in radical resections. In the cases of bone or cardiage extension monthly biopales of suspicious areas, followed by further exclusion il positive, were practiced for from six months to a year before plastic operations were done. Thierachollier skin garfa and plack grafts for indeced defects, and skin faps and full thickness grafts for larger defects were used. A complete statistical analysis of the surgical and radiation therapy is even. The results seem to be excellent. I method of regular f liew up to catch early new cases or recurrences for a period of from three to hive years, or preferably for a lifetime at yearly in tervals after five years in practiced

JAY P BARTIST M.D.

# EYE

Gillan, R. U : An Analysis of 100 Cases of Strablemus Treeted Orthoptically Brit J Ophia, 1945 29, 420.

This article is a study of binocular function in 100 patients who were treated in 1943 and 1944 at the West Bromwich and District Hospital. The patients were divided into 3 groups

1 A group of 63 who were treated by orthoptic methods only. The results showed that in 36 patients the condition was corrected and there was good stereoscopic vision.

a A group of 37 patients who were treated by both orthoptic methods and surgery. In 23 the eyes were described as straight and 17 of these developed good or fair stereoscopic vision.

3. A controlled series of 50 patients under observation for an average of nine months with no treatment other than lenses. This treatment did not result in the development of stereopsis in any case.

An analysis is made of the refractive findings is the roo patients studied. The question of a possible strabinum is discussed, and the absence or failure of stereoscopic vision is held to be the greatest ethological factor in its development.

HUNTER H. ROMANIA, M.D.

Shenkin, H. A., and Leopoid, I II : Localizing Value of Temporal Crescent Defects in the Viscal Fields. Arch. Faur P yeligh, Chic., p45 54 67

The fact that the most peripheral portion of the temporal visual field has an unpaired representation in the optic pathways and visual cortex has been well recognized this unpaired portion is called the temporal crescent or half moon. The paired portion has a diameter of approximately 100 degrees and the unpaired portion extends for from 30 to 40 degrees on each side beyond the paired portion. Bender and Stranzs (Arch. Ophth 1937 17 763) reported 10 cases in which, as a result of defects in the optic radiations an unpaired crescentle or hemicrescentic vision existed in the periphery of the temporal field. They concluded that an unpaired peripheral scotoms indicates an early defect in the optic radiations, and that such a finding has localizing value in the early diagnosis of tumor of the brain.

It is the purpose of this article to substantist these observations of Bender and Strauss with 5 verified cases of brain tumor and to emphasize the value of this sign as an aid in the practical localization of a pathological cerebral process.

In the first case, perimetric studies showed a distinct crescentic cut in the right field of vision without any changes in the central field Operation in this patient uncovered a large meningioma in the left nameto-occipatal region. In the second case there was a crescentic cut in the left visual field and meration disclosed a large meningioms of the right mrietal region. In the third patient, in whom a temporal crescentic defect in the left visual field merested injury to the right optic radiation a bone fan was turned down in the parieto-occupital region but the dura was not opened. Perimetric examina tion performed four weeks after the first surment procedure showed an incongruous left homonymous hemianopsia Subsequently the tumor was exposed and proved to be a well demarcated cyatic astrocytoms deep in the right parieto-occupital region In the fourth case a temporal crescent defect in the ight visual field resulted in uncovering a large costic glioms of the left parietal area and, finally in the fifth case a temporal crescent defect in the left visual field with, as in the previously cited examples no ugn of changes in the central field was apparently nduced by a glioblastoma multiforme of the right temporoparietal area.

The author admits that no exact anatomic infor mation may be derived from these cases as the position of the tumor itself may not tell the entire story that is cerebral tumors produce edema and other distant phenomena which may also cause disturbances in the fields of vision. However he believes that the 3 cases here reported bring out the importance of the temporal crescent defect as an early localizing sign, and thinks that a c degree difference between the two fields should be regarded as significant. JORN W. BRENNAN M.D.

Wright, R. E., and Stuart Harris C. H : The Pene tration of Penicillin into the Eye Brit J Ophila., 1945 10 418

This article describes the clinical and biological techniques used in evaluating the penetration of penicilim into the eye. It is noted that the penicilim that reaches the aqueous humor after local use or miramuscular injection is of very low concentration. It is noted that the use of iontophoresis gives a far higher intraocular concentration, but the method of application is a technically difficult procedure. The procedure is described.

HUNTER H. ROMAINE, M.D.

Davidson, M : Compensation for Ocular Injuries in the United States. Am J Ophib 1945 28 856

As is well known to those engaged in industrial work, there is a great discrepancy between the laws of the various states regarding compensation for an industrially damaged eye. The Federal Government stell operates with two standards in different de partments. The range is so great that five times as wach a given in some states as is awarded in others for the loss of an eye This calls for standardization of benefits for permanent and temporary visual dishbity for facial disfigurement and for percen tages of weekly wages to be paid out.

There are six main items which should be esublished

I The amount that should be awarded for the loss of an eye, or loss of its use, in terms of per centage of the award for permanent total disability 2 The definition of loss of use of one eye and loss

of use of both eyes (permanent total disability) t The definition of normal central visual acuity

for distance and the degree of departure from normal that is subject to compensation

4. The method of dealing with partial loss of central visual acuity for distance

5 The method of dealing with the principal col. lateral or auxiliary functions of vision (muscles fields, accommodation)

The maximum deduction for temporary dis ability if any from the award for permanent dam

age to an eve

Each of these subjects is discussed in detail with illustrations of the inconsistent treatment in various states and much of the report of the Ameri can Medical Association Committee on Visual Economics is analyzed and criticized

It is recommended that the average annual cost of compensation be taken as a standard and be made uniform for the country The prevention of accidents is really the big problem and headway is being made in that direction WILLIAM A. MARIN M D

### EAR

McCurdy G J Endaural Mastoidectomy Five Lears Experience Larragement 1945 55 349.

Thus is a report of 122 cases of endaural mas toidectomy performed over a period of five years. Certain disadvantages are mentioned for the simple mastoldectomy such as persistent bleeding the formation of unsightly scars and the difficulty in reaching tip cells in certain cases Trauma to the temporal muscle occurs occasionally

Among the advantages are continuous drainage during wound healing and the fact that the zygo matic cells can be dealt with more easily operative care is reduced to a minimum and the scar is usually invisible. No packing is necessary in the depth of the wound.

There were no disadvantages in radical and modified radical cases, but there were several distinct advantages among them were better exposure of the entire mastoid areas no necessity for plastic surgery at the end of the operation and the absence Jour F Drien M D of postoperative packing

## NOSE AND SINUSES

Griesman B. L.: Structure of the External Nose A Study from the Point of View of Plastic Sur gery Arch. Otolor Chic., 1945 42 117

The author states that the final cosmetic result of a rhinoplasty depends not only on the surgical procedures but also on the influence of intrinsic and extropsic stresses on the process of healing

The force of mastication is the main physiological stress on the facial skeleton in the vertical and longs

tudinal planes. The nasoftontal, malar zygomatic, and pterygold buttreness transmit the chewing stress to the vault of the skull.

The nasal septum has a complex function in that the vomer seems to transmit chewing stress to the body of the sphenoid. The cranial portion of the septal cartilage and the upper lateral cartilages form a resilient arch to keep the nostrits open, and the caudal portion of the septal cartilage aupports the nasal tip. In the typical rhinoplasty the lateral esteotomy interrupts in part the lines of force in the anterior or nasofrontal buttress. The act of chewing in the postoperative period tends to cause more callus to be formed along the sawcuts which, in turn may interfere with the desired cosmetic result. Therefore it is recommended that the chewing of hard or tough foods be omitted during the first six weeks following operation and that bring with the in creors be prohibited. JOHN R. LINDSAY M.D.

# MOUTH

Lawrence, E. A. and Brazina P S.: Carcinoma of the Oral Cavity J Am. II Am. 1945, 28 to 2

Lawrence and Brenna report a series of 145 cases of carcinoms of the oral cavity seen at the New Haven Hospital, New Haven, Connecticut January 1 1931 to December 31 1930 inclusive.

The largest group of cancers from the point of view of numbers occurred in the hypopharynx and posterior tongue Anatomically they include all tumors in the pharynx lying between the circum valiate papillae of the tongue and the extrinsic The tumors of the anterior part of the tongue include all which are anterior to the circumvallate papillae the tumors on the floor of the mouth include those in the area bounded laterally and antenorly by the inferior alveolus and medially by the tongue the tumors of the alveolus include those in both upper and lower gum margins the tumors of the buccal mucosa include those in the mucous membrane lining of the cheeks and inner lips the tumors of the palate include those of both the soft and hard palates and the tumors of the tonsil include tumors originating in the tonsillar fosse. There were a few cancers of the oral pharynx that were so extensive and involved such a large area (palate, tonsil, base of the tongue and floor of the mouth, for example) that they were difficult to classify as to their point of origin. Therefore since they would have formed such a small group as to be completely meaningless, they were placed in the major groups according to where the bulk of the tumor lay

"The therapy of oral and pharyngoul carcinoma is a difficult and discouracing problem. There can be only rare individuals who are naive enough to believe that radiation therapy and surgery are ideal therapeutic instruments. Yet, until something better is discovered, these two methods remain our only hope of obtaining survivals in the treatment of this as well as of other cancer. Until that method

appears, attempts at improving our results must be directed not only toward the more intelligent use of these two instruments but also toward making them more available to the general public and practicing physicians at large, and toward education the public and physicians in the early signs and symptoms of this disease. Perhaps it is incongruous to suggest, in face of the fact pointed out that there was no more delay in the failure group than in the successful one that early diagnosis is important. How ever it is a simple platitude that a small tumor is more easily and satisfactorily treated than a large one, and if the individuals harboring such tumors could be seen when the tumors are small there is no doubt that greater success would be obtained. Seven of the 26 patients with carcinoma of the hypopharynz stated at the time of admission that their chief com plaint was a lump in the neck. In other words, more than 25 per cent of the patients in this group were complaining of something which indicated that for practical purposes the disease was beyond the curable stage. What would have happened if the tumor had been discovered when it was only 1 cm. in diameter?

The educational program must be intensified in the dental profession as well as in the medical profersion so far as oral carcinoma is concerned. Thirty seven of the patients in this series had been seen tirst by a dentist. Ten of the 22 with alveolus tumors had been seen and treated by a dentist before being referred for medical care, and 8 of these had delayed for more than two months. One had been under active care for nearly a year and a half. If our primary objective were to find and treat the disease before the regional lymph nodes become involved, the salvage would be large. A specific example is shown by the tumors on the anterior part of the tongue only 2 of the 14 patients with lymph-node involvement survived five years whereas 3 of the 9 without node involvement were living and well at

the end of the same period. As far as therapy tself is concerned probably the cardinal point in successful management is attention to detail. The utmost care must be med in locallzing the tumor and involved nodes, if present, in localizing the treatment ports, in directing the treatment beam precisely not only at the initial treatment but also at all other treatments, in management of the radiation reaction and in securing trequent follow-up examinations in the early post therapy months so that if an extension or recurrence appears further treatment can be initiated promptly The problem of desage is not complicated. If epidermoid carcinoma is to be destroyed, a dose of at least 5 000 roentgens must be delivered into the tumor This usually requires supplementary inter stitial radon in addition to roentgen therapy Ideally the z ray treatment should be administered n about twenty-one treatment days, and radon should be inserted when the tumor has regressed to its maximum degree. The authors believe that

radiation should not be delivered so rapidly or so

estensively that it will produce a pronounced degree of tumor necrosis with infection because it is their mpression that infection stimulates tumor growth.

BENTAMIN GOLDMAN M.D.

#### NECK

Sandberg, I R.: Dissection of the Cervical Lymnh Node Regions for Metastasis from Mallenant Tumors of the Lip, Oral Cavity and Pharynx Ada chir scand., 1945 92 90.

The lymph node regions to which cancer of the lips mouth and pharynx first spreads are described and illustrated. The submental and submandibular regions and the superior and inferior deep cervical nodes are apt to be involved. Three operative methods are used for the surgery of these lymph ghad metastases. The first consusts of radical masuve dissection of all the primary lymph nodes myolved, the second of dissection of the subman dibular region with or without that of the submental repon, and the third of extirpation of single lymph nodes or groups of nodes. The latter method is intifiable only for purposes of diagnosis. The tech sique of operation is described in detail and illustrated

A discussion is given of 73 cases of lymph gland metastases operated on at the Karolinska Hospital in Stockholm 93 operations were performed in these

Fifty-six of the patients were men and 17 were somen. The youngest patient was 35 years of age the oldest 80 75 per cent of the patients were over 50 years of age 41 per cent over 60 and 18 per cent over 70. A table is given showing the site of the primary tumors and the nature of the operations

In radical dissection, especially in advanced cases it is almost impossible to avoid injury of the nerves There is often transitory paresis of the facial nerve and sometimes permanent injury. The accessory nerve is also quite frequently injured which results in partial paralysis of the trapezius muscle. Dissection of the internal jugular vein is sometimes slow and difficult and runture of the wall of the vessel may cause fatal air embolism.

In this series of 73 cases there was only 1 death 4% mortality) The patient was a man of 54 (r 4% mortality) years who died of anoxemia resulting from laryngeal edema. Among the 30 massive radical extirpations performed on 37 patients the mortality was 2 7 per cent. The mortality at the Zurich Clinic from 1927 to 1936 was 14.4 per cent (13 deaths among 113 pa tients) but the massive radical method was used in most of these cases. The average stay in the hospital for the author's cases was 10 5 days. This was nerhans shorter than usual because most of the nationts were removed to the Radiumhemmet for postoperative irradiation. It is hard to determine by histological examination whether a piece of tissue has been irraduated or not for the changes caused by irradiation may also occur spontaneously

It is difficult to judge the final results in this series of cases as the time since operation has not been long enough. But among 53 patients who were examined a year after operation, 31 were alive and free of signs of recurrence 8 showed recurrence 12 had died from cancer and a had died from other diseases

AUDRLY G. MORGAY M D.

# SURGERY OF THE NERVOUS SYSTEM

#### PERIPHERAL NERVES

Denny Brown, D., and Doherty M. M.; Effects of Transient Stretching of the Peripheral Nerve Arch. hes. Psychiat. Chica, 1945, 54-116

Dense intrincutal fibrois of the peripheral nerve without anatomic loss of continuity is seen in modern warfare. It is due in some way to the passage in clove proximity to the nerve of a projectile traveling at high velocity. The authors previously investigated the pseudometeroma produced by percursion of a peripheral nerve which does not conform to the lesion under discussion. Because of the great and rapid distortion of soft tense produced by the impact of a high velocity bullet, the possibility that this caused a sudden longitudinal stretch in the

nerve was investigated

The reproduction of such a rapid longitudinal stretch by experimental methods is difficult, and finally it was decided to produce the stretch by means of gra pung the nerve in the gloved fingers The peropeal perve of the cat was used and the animal was placed under pentobarbital anesthesia the nerve was marked at measured intervals and the extent of the stretch wa recorded in percentage terms survival ranged from 5 to 140 days. A table with the exceptial points is provided. When the nerve was stretched until the distance between the markers was increased 100 per cent, there was liten no sign of hemorrhage within it and only slight weakness was noted when the animal recovered from anesthesia. Full motor power returned within four teen days If stretching was continued beyond 100 per cent of the distance between the markers a sharp crack" or 'snap occurred. A small white bernia of perve tibers was seen next to the main nerve bundle and if tension was pensisted in the whole nerve bulged out through the sheath. The respitance of the nerve to further tension was then much re-The heralation was always followed by complete parairsis. The smallest bernia was allowed to remain 141 days recovery commenced about the twenty first day and was complete in 48 days. On section a large pseudoneuroma was found In the early tage of a small bernia rupture of the epe neurial vesch and thrombosis of the small arterioles were found on section.

The difference between benign pseudoneumma and rure neurona depended on the degree of disorganization of the architecture of the neave builded in the control of the street of the neurona but not from the true neurona. A test for perincural continuity is therefore of practical importance. The injection of saline solution along the neural fasciculus is the most useful test and the one most commonly employed. The true heuronas is also adherent to the surrounding structure, whereas the preedonatourona presents a smooth, nathroten

surface Unfortunately high velocity boliets often result in some fissue in the proximity of the nerve which, whether it contains a pseudonearoma or not, may be adherent to the surrounding structures

ADDIES VERBETOGERS, M.D.

Ward, R. L. and Mason, A. S.: Polyneuritis after Jungle Soree Brit M J 1945 1 52 Among the many appalling geographicsl and cli-

matic hardships in the Burness purgle were length scores which were multiple indolent ulcers developing usually on the lower leg or forearm. In a patients who had had jungle sores pertipheral polymentis was found. In all but 1 the sores had healed before and mission 1 the hospital on account of the neurits. The typical ulcer was about 34 inch in diameter and circular or over in tapes and it presented a secretic,

sloughing nunched out appearance

The clin cal course was rather typical. In 16 cases the first as improon of nervous involvement was blor ring of the vi lon which came on about y acrds after the jungle sores began. There was disturbance of servation in all of the cases authorized in the mild ones that amounted in it. I pare-the-fall There was occasional lifficult in writing and in walking it ever cases the was progress for weather-stoff the improvement of the transfer of the improvement of the transfer of the improvement of the service of the carrowalcad to the point where walking was important to the property of the cases there was ascertberia at 1 recognoses and attait. A table with the principal signs and ayapphone is provided.

The ethology of the polymentis was of particular interest Chemical posts oculid be extended. When polymentitis was due to vilamin B deficiency it reponded to vilamin therapy in contrast to these cases. A torin was unpected and diphtheria barfils were faciated from the sorts. The paralysis decommodation also go a support to this view. There was no relation between the site of the sorts and the labs in which the polymentis developed. The torin could not be obtained. Ordinary diphtheritik unfection was a very unlikely possibility in possibility.

Because of the circumstance no laboratory in restigations were possible and the cases are presented from the purely clinical standpoint.

Apanes | rabatecars, M.D.

## BRAIN AND ITS COVERINGS CRANIAL NERVES

Michaelmon E.1 Pneumocephahrs. Acis chr at ad 1943, 89 8

In external pneumocephalus the air is situated between the skin and the skull in internal pneumocephalus it is found inside of the skull. Increacephalus generally results from fracture or pentrating injuries of the skull, although it says be caused by chronic infammations such as jubercu Is an or yhibin. The fractures that must frequently came it are those of the frontal bone. The most common type of pneumocephalus is the subdural Tre symptoms are rather indefinite being those of certail pressure in general. Diagnosis by contigen emmination is now quite simple. There are two dangers to be feared infection and cerebral pressure. Dandy advocates immediate operation in all cases on account of these dangers.

The author describes a case in a young man of 16 years who fell from his bicycle on July 12 1941 and incurred a fracture of the right frontal and ethmod bors. On admission to the hospital there was bleeding from the nose but not from the ears and the calv apparent injury was a cut 3 cm long in the right frontal region which was sutured. He had apparently recovered completely when he was darked on the 4th of August. No roentgen examination of the skull was made.

About two weeks later he began to have a dis change of fluid from the nose Roentgen examins ton showed a fracture of the frontal bone which probably extended into the ethmord and there was air underneath the dura and throughout the ven tricles. He was put at rest in bed and later sulfona mide was given. He had a subfebrile temperature with occasional peaks to 38 6°C and a leucocyte count ranging from 11 000 to 17 000. On September 18 the right frontal labe was exposed, trepenstion was done, and air and liquid were aspirated from a softened portion of the right frontal lobe over which the dura was thin and flabby although there was no definite defect in it. A graft of fascia lata was placed over the changed part of the dura and the patient made an uneventful recovery

As there was no real defect in the dura the good results could hardly be credited to the fascia transplant. It is possible that the aspiration of fluid and air brought about the recovery

AUDREY G MORGAN M.D.

# Gaynor W. C. and Gurwitz J: Experiences with 156 Penetrating Wounds of the Head. Ans. 5ut 1945 1s2 12

A terms of 156 consecutive cramotomics per formed in a forward hospital for penetrating wounds of the head are reported. The dura was intact in 10 case and penetrated in 137. The average time in terral between mijury and definitive treatment was twice hours. The authors agree that these palems can be tramported better before operation than after but they believe that the delay (up to territy two hours) required to get the injured back to a base hospital would not be tolerated by many. The forward evacuation hospital presents the ideal place for this surgery since it is the most forward its where adequate neurosurgical facilities are available and a roenteenologist is present.

The management of these cases is described in detail. It conforms in most aspects with that recently reported by other workers. Endotracheal ther anesthesis was found to be the one of choice

after extensive experience with local anesthesia and intravenous pentothal

The authors found a long magnet up to be very useful in removing metallic foreign bodies. The latter were consistently found to be contammated when cultured and it is believed that all metallic as well as bony foreign bodies should be removed.

The operative mortality was 10.8 per cent (17 deaths) There were 5 cases in which the ventricle was opened and 2 of the patients died. The frontal sinuses were involved in 26 cases. The sinus walls and mucous membrane were removed which obliterated them. The results were stated to be satisfactory. There was no selection of cases except in times of heavy fighting when there might be several head cases waiting. In such instances priority was given to the patients with the best chance for sur vival and return of function. Thirty four other than those included in this series were seen in the receiving tent and 33 of these died promptly.

The wound tract was dusted with sulfanlamide in the early part of the series, and filled with from 7 500 to 20 000 units of penicillin in the later cases. The dura was closed in all cases a graft being used in most instances. Fasca lata was used in a few cases but temporal fasca pencranium or galea was used in the majority. Cadaver dura was used in 33 cases with no early untoward results. It is preserved in 10 per cent formalin for forty-eight hours and then in 70 per cent alcohol indefinited.

Two thirds of the patients had other wounds as well. Head wounds can generally wait for treatment better than extensive wounds of the abdomen chest or extremities. The staging of multiple operations is better than doing all of the surgery at once. Nine cases operated upon in stages resulted in a deaths, while cases operated upon in one stage resulted in 3 deaths. HEMER A. SITEMERS M.D.

# Redlich F C. and Dorsey J F: Denial of Blind ness by Pattenta with Gerebral Disease Arch \sur Psychiat Chic, 1945 53 407

Detailed reports are given of 6 patients who were blind but who denied their blindness. The patients all had diffuse cerebral kesions and showed mental deterioration with disorientation impairment of recent memor, and amment aphasia. The under lying organic disease was diabetic retinopathy in rease optic atrophy in rease and bilateral bemian organ due to tumor or vascular lesions in 4 cases.

The authors also review the literature. In their opinion mental deterioration alone does not explain the syndrome they believe that the interruptions of reverberating arcuits between the thalamus and the sensor; cortex constitute the outstanding etiological factor.

ADRIEN VERBRUCOREN M.D.

# Dandy W. E.: Diagnosis and Treatment of Strictures of the Aqueduct of Sylvius (Causing Hydrocephalus) Arch. Sug. 1945 51 1

The symptoms of hydrocephalus may appear in infants or in older children in infancy of per cent

f the cases are due to congenital stricture of the equeduct of Sylvius and in childhood 95 per cent are due to tumors. In infants cases are seen also in which hydrocephalus occurs as the result focclusion of the foramens of Magendle and Lurchka In both aqueduct and foramen obstruction, the dye test with phenokulfouphthalesa will show it There is however one differential point in obstruction of the aqueduct the inion is low whereas in obstruction of the foramens of Magendle and Luschka the inlon is high. This is due to the location of the obstructionin one the tentorium is pushed upward and in the other downward In children and adults without localizing cerebellar signs, ventriculography may have to be done to localize the site of the obstruc tion in most cases in which complete filling of the ventricular system has been accomplished, an accurate localization of the point of obstruction is possible. The height of the inion has been used for diagnosis in 5 cases without ventriculography and operation, in which there was a stricture of the aque duct

Ventricules tomy has been the operation of choice in dealing with these cases. Cerebrospinal fluid is short-circuited from the third ventricle into the cisterns at the optic chisam and cerebral pedundes. It appears to be essential to open the floor and not the roof of the third ventricle. Two types of ventriculations, through the floor have been employed. The author in 1923 proposed an anterior appears through a small suprisorbital incision. This was not always satisfactory because an optic nerve had to be sacrificed to gain exposure to the floor of the ventricke, and because the fluid was often improperly shorted. The procedures advocated by White Stookey and Scarf and by Torkflosen are not considered satisfactory.

It is now proposed that a lateral approach is more likely to sathfy all the conditions. With the child's head in a plaster cast, the right temporal region is opened through a curved inesion. Through a small bony opening the lateral ventricle is tapped and the temporal lobe elevated from the middle lossa. The edge of the tentorium and the oculemotor nerve are brought into view. The bulging thin floor of the third ventrucle is seen and is opened with a nerve kalle the opening is then enlarged with alligator forcers.

Twenty nine patients over 1 year of age were treated by thus method 5 in the first 5 years of life, 5 in the second 5 years, 15 between the tenth and twentieth years and 4 after the twentieth year The oldest patient was 45. Thirty-six ventriculestomies were performed on these 29 patients (in some the opening had subsequently closed). There was 1 operative death, while 24 patients are living and cured.

Sixy-three patients under a year of age were operated on by this method, ro of whom dred in the hospital and 53 survived. Only 5 are perfectly healthy children some have died since they left the boxy tat and others have mental or visual defects.

When the head is not most than from 50 to 52 cm. in diameter the operation is probably worth while. Apairs Versionaries M.D.

Ingraham, F. D., Bailey O. T., and Cobb, C. A., Jr.: Fibrin Film. J. 4 m. M. 421 1945 18 1083.

Neurourgeons have long sought a suitable metrial with which to cover the brain and to replace dura mater but so far none has been really attactory. The substance, thint film, may be the amsert to the problem. Its descover, and use were incidental to a protracted program of research under taken at Harvard Medical School on the Studies of Plasma Proteins and this paper is ho ay in the series. Large quantities of fibrinogen and throughout the proteins it has been possible during the program and from these proteins it has been possible to prepare fairful film. A great many films can be produced but this one

was selected for the following reasons

1. When this film is placed over the brain of man
keys it is gradually replaced by a neomembrane of
fibrous tissue without the formation of meningo-

cerebral adhesions
2 It is possible to sterilize fibrin film in the final glass ampoule by steam under pressure

3 As judged by animal experiments the film is largely removed in 3 months and completely removed in 6

4 All patients remained free of symptoms refer able to fibrin film The film has been used in a total of 94 neuro-

surgical cases presenting a side variety of lesions. Fr m the technical standpoint the film is easy to use. It is packed in a glass ampoule from which it is removed under sterile conductions in a dra and brittle state. After it is soaked in saline solution for 13 minutes the paper wrapper is removed and the film placed in cool saline solution until it is required. In this start, it is soft, plable clastic, transparent, and easy to handle provided it is kept most. It is rarely processary to secure the film in place: we the brain,

although this may be done if desired Approx \ resuccomms, M.D.

Shalom E. S.: Purulent Meningitia; Use of Hyper tonic Solutions in Treatment Land Lord 945, 249 36.

Purulent meniogitis may lead to adheave obstruction at the foramen marmon and bypertosic parenteral fluids may relieve it, this is the main argument of this closely reasoned paper. The ideas are developed from 11 cases of purulent meningitis seen in the last five months. In 8 cases, and probably in the ninth case the pneumococcus was located and in another case the streptococcus progenes was found. The remaining case also revealed purulent spinal fluid but no organiam was identified even though the staphylococcus aureus was located from the wound and from the blood.

The theory of obstruction at the foramen magnum was deduced from two facts first, early in the meningitis, spinal fluid pressures in the manometer were of the order [ 300 mm | r ver | her as m late ponetures a pressure of ver 100 mm wa made obtained | co. not during the nitwolind pendure rather late in the disease there wa a parguistic slowing in the rice of fluid in the mu | m | r | ba dishal and mechanical ground is the wa taken to be due to the descent of the cerebellium and imedifial into the foramen magnum | Ver | c imilarity to these findings exists when a junal punctures are due on brain tumors with increased intracranial person. There is a detailed descript in | f the deficial cases on which these a sumptions are base |

The clinical significance is twofold (1) the lateston at the foramen magnium may give rise to a petitive of interested interestrial pressure with stoper, Cherne Stokes respiration and I was go the pulse to 60 per min and (2) the obstructs in also perceist the entrance of the rapeutic agents with a peacilian and their reaching the cranial cavity after their baye been inserted into the lumbar ultimach and space.

Experiments were carried out on 2 ca— ith a rer to relieving the obstruction and fa distating the entrance of pennelllin from the junal int the carbin subarachnoid space. The intrana cular used to per cent destrose in physiological we found distance was used to decrease the intracranual presente and to relieve the foramen obstruction and in this way allow free access of the penn illin from leby.

Trainent consisted of full doses of sulf 1 and 1 and the case sulfamezathine by menth 1 her or consisted an essential part of the trainment Pencillan and hypertonic solutions were given intra mescalarly included doses. The pencillin and the hypertonic solutions were mixed together and the excess of the solution of the pencillan and children a suitably reduced design. All the solutions are consistent to the solution of the s

Three deaths occurred—all in pneumococcal case—and in only t did the examinata n show evidence of active meningtis. In this case, it is was found of active meningtis. In this case, it is was found of active meningtis. In this case, it is was found of active meningtis. In the facts of pus below the tentorium. One death was dae to bilateral basal bronchopneumona which was death occurred by the meningtis. The third death occurred during a convolves secure but very little evidence of meningitis was found at satopay.

America Versasioneris. M.D.

# SYMPATHETIC NERVES

Ketter E. F : Adrenosympathetic Syndrome Assoclated with Paraganglioms of the Organ of Zuckerkandl Okio M J., 1945 41 719

The patient was a thirty four year-old female with a three year history of recurrent episodes of head

ache nau ca and vomiting insemnia irritability flishing and sweating with moderate prostration. During an attack examination revealed a blood pressure of 2007/10 and a pulse rate of 120 Precipitation of the pressure of 2007/10 and a pulse rate of 120 Precipitation and a pulse rate of 120 Precipitation and there were no signs of cardiacentary and the every new processing the specific characteristic of the urine was 1023 and the qualitative level (the albumin in the urine was 4.4).

The neck was rigid and lumber puncture revealed all six punctured under slightly increased pressure. In re-wa-a positive Babinski reflex on the right and thought pupil was larger than the left. Builderal papilledema was present.

The fatient rapidly developed a right hemiaresis passed into coma and died within thirty six bours of a lmi sion to the bosnital

Aut | 1 revealed an extensive intraventricular and subarachn is themorrhage. Cross sections of the brain an | examination of the meningeal vessels failed t reveal the origin of the hemorrhage to a unit encapsulated tumor (a b) 3 by 2 cm ) was 1 unit attacked to the anterior surface of the aorta immediately caudal to the renal arteries. Microscipic diagnosis revealed benign paraganglioms of the 1 gan of Zuckerkandi.

The amptoms of this patient were believed to be produced by the periodic discharge of adrenaline or a frenalinchies substance into the general circulation. Aut just a vealed an associated moderate degree of renal arteric lar sciences. There is a possibility that the hypertension was associated with the renal liseal rather than with the tumor.

HENRY L. SHLAKIN M D.

Kirtley J. A. Jr 1 Experiences with Sympathec tomy in Peripheral Lesions. 1ππ Surg., 1945 122 29.

The war has demonstrated a variety of indications for sympathectomy in peripheral lesions. This is borne out by a report from a general hospital in a Theater of Operations in the period from March to September 1044. The operations were performed for the following conditions tender feet arterial injuries post traumatic vasospastic conditions obliterative vascular disease and causalgia. All were keilons of the lower extremities.

Twenty three operations were performed on 17 patients with trench feet the interval between expoure and operation varied between between exmonths. Repeated lumbar sympathetic block had been tred but was found to be success ful only in late cases with pronounced vasopasm. Removal of the second and third lumbar sympathetic ganglia made it possible to return so per cent of the stients to duty within a month. The best results were obtained in the patients with severe hyperhidrosis macer atton and secondary infection.

In the 10 cases with injuries of the main arteries in the leg especially the populiteal arter; the aym pathectomy was limb-saving in some and frequently permitted amputation at a lower level. Patients

# SURGERY OF THE THORAX

### CHEST WALL AND BREAST

Brantigan, O. G., Aycock, T. B., Hoffman, R., and Weich, H. J.: Relating Thorscopiesty J. Theor Surg., 945, 14, 237

In pulmonary tuberculosis three general types of lungs with corresponding brough can be recognized In one type of lung, the bronchul condition leads to increased intrapulmonary pressure or increased pressure within the tuberculous lesion. It is one in which, either because of organic factors or muscular spasm involving the bronchial musculature, air freely enters into the alveoli during inspiration but its escape is delayed on expiration. In the second type (as opposed to increased intrapulmonary pressure) a form of bronchial condition occurs which leads to a hypotensive lung. In this type the broughus may be partially or completely occluded by organic disease or its secretions or by a decrease in the tomus of the bronchal musculature thus permitting only a mmimal amount of air into the alveoli, but allowing this art to escape easily. In the third type of hing, the bronchi may be free of organic or spasmodic involve ment. Air is permitted to flow freely in and out of the alveol; and bronchial tree. This produces a lung with normal intrapulmonary pressures.

It appeared evident to the authors that if the thorace cage could be related when the contracting phase of bronchial disease occurred, perhaps the long could contract early because the restraining force of a rigid thorace cage had been removed. The same would be true if healing was taking place by sear tissue contraction. Thus contraction would be encouraged and it would be more likely to remain until the healing was complete. The belief that a relaxed thorace cage might be more desirable than a rigid collapsed thorace cage is strengthened by the evidence that collapse of the lung in tatelf does not

necessarily mean healing nor cavity closure With these principles in mind, an operative procedure, which is a modification of Monaldi's opera tion, was undertaken primarily for patients with ten som cavities and for those with extensive disease from the apex to the base on one side but without ciant cavities By interrupting the murcles of the superior aperture paralyzing the diaphragm, and doing costectomies along the dominant line the chest is made static and the lung is freed from respiratory trauma. The operation is divided into 5 to , stages If this series of operations fails to bring about an arrest of the disease, the operation can be converted into a standard thoracoplasty Patients who are not suitable candidates for the standard thoracoplasty might thus be brought safely to such a

The operative procedure was carried out on 33 patients. Their ages varied from 19 to 55 years with the greatest number occurring between the ages.

of 30 and 40 years. The longest period of observation was approximately two years and the shortest ten months. In 3 patients the relaxing thoracoplasty was converted into a standard thoracoplasty and, of these, 1 died. Five deaths occurred in the series.

It appears that the patient with a giant cavity is not a sustable candidate for this operative procedure unless one is content with bringing the lesion and the patient to a condition in which the relaxing thoracoplasty can be converted into a standard thoracoplasty Whether this operative procedure will adequately arrest the duesse in the tension type of lung has not been conclusively refuted or affirmed. The patient with a concomitant disease or the one with some collarse of the contralateral lung is a good candidate for this operation. It also appears likely that the patient afflicted with the disease from the apex to the base on one side, but without guant cavities is an ideal candidate for this operative procedure rather than for a complete standard type of thoracophsty The individual who has a pulmonary lesion which can be controlled by a one-stage standard thorscoplasty certain! should not be subjected to this type of operative procedure

On the whole, results are encouraging and orr tainly worthy of further study. Many patients who formerly had no hope of the disease being arrested are now brought within the realm of surgical treat ment. Only time will determine the worth of the operature procedure as well as its indications:

JOHEFE E. NARAT M.D.

Engelstad R. B.: On the Treatment of Curcinoma
Mammae. Act chir stand on 87 545.

It is hard to compare statistics for cancer from dif ferent hospitals because of the differences in classifcation and methods of treatment. The author presents the statistics of 553 cases from the Norwegian Radium Hospital, pointing out that the results are unfavorably infinenced by the fact that so large a proportion of the cases were in the late stages, because of the nature of this bospatal. Notwithstanding this fact, the patients had 3 years of freedom from recurrence in 91.4 per cent of the cases and 5 vears of freedom from recurrence in 92.5 per cent of the cases in stage I The 3 year and 5 year figures for freedom from recurrence in stage 11 were 59 1 and 52 2 per cent, respectively. The differences in treatment methods are shown in this group by the fact that the 3 ) ear and 5 year survivals after post operative radium treatment were 65 4 and 64-5 per cent, respectively while after other methods of treatment they were 40.2 and 48.5 per cent, respectively The figures for 3 and 5 year freedom from symptoms in stage III were 10 and 8 per cent, respectively and in stage IV 8.4 and 8.s per cent, respectively

The conclusion is reached that irradiation treat sent cannot replace surgery but that it is a valuable supplement to it. It is believed that the best results can be obtained by giving irradiation treatment postoperatively in one series in as large doses as can be given without injuring the normal tissues and without producing too great leucopenia in the blood Radium has been found superior to roentgen ravs for postoperative treatment.

Local recurrences were for the most part treated by the application of radium lymph node metastues, with teleradium or roentgen irradiation and steletal metastases with roentgen irradiation in does of from 2,000 to 4,000 roentgens. Visceral metatases were given palliative roentgen arradiation in a few cases. There was bilateral involvement in 7 i per cent of the cases 24.5 per cent of these were hee from recurrence after three years.

The greatest number of cases of cancer of the breast are seen in the age groups from 40 to 49 and from 50 to 50, that is around and immediately after the menopause. This shows the importance of hor sonal conditions in the development of these tumors further study should be devoted to hormonal in fuences and to the histological types of these can cen. The prognoses is unusually bad when cancer of the breast coincides with pregnancy or inctation and if is worse in the younger age groups than in the AUDREY G MORGAN M D

# TRACHEA, LUNGS, AND PLEURA

Inliman H. J. F. and Crellin J. A.: Penicillin in Suppurative Disease of the Lungs Due to Streptococcus Hemolyticus Ann Ini II., 1945 23

Two patients with lung abscess which developed in the course of sulfonamide resistant streptococcus knolyticus pneumonia were successfully treated by the authors with parenteral penicillin The number of days of penicillin therapy 14 and 24, and the total donge of 1,475 000 and 3,020 000 units are indica tre of absorption of penicillin through thin walled civiles when administered over a sufficient period of time. The sputum in the 2 patients became nega tre for hemolytic streptococcus in three days and tro days respectively Complete healing demon trated by roentgenogram occurred in twenty-six and thirty four days respectively

Intrapleural injection of penicillin supported by intravenous and intramuscular use of the drug obvaled thoracotomy in 4 patients with streptococcus amolyticus empyema, 2 being classified as sulfona ande resistant and the other 2 being considered noriband.

There was no evidence of reinfection or recurrence and applicated pleural fluid remained sterile after from \$4 to 36 hours, when the intrapleural treat ment was supplemented by intravenous and later intramuscular penicillin One patient receiving only intrapleural penicillin retained an infected pleural Secontil the sixth day after treatment was started

which would indicate that success or failure may hinge upon the supplemental parenteral administra tion of penicillin.

Residual fibrosis and subjective alight dyspnea necessitated the return to a limited duty status in r patient a seaman who had had repeated infections with periodic asthma since the age of four The 3 others returned to a full duty status in 125 146 and

STEPHEN A. ZIENAN M.D.

# Rudensky H. Sprong, D H Jr and Woods, C. C.; The Treatment of Empyema. J Am M Au

The addition of sulfonamides and penicillin to our therapeutic armamentarium has considerably im proved the results of the treatment of empyema. Five cases are reported in this study a of which were putrid empyemas following ruptured lung abscesses The patients were treated with sulfadiazine and peni cillin administered intramuscularly and intrapleu rally following thoracentesis This combination has proved beneficial in mixed infections both aerobic and unaerobic. No untoward effects were noted from repeated thoracentesis. One case of postpneu monic empyema was treated with penicilin intra muscularly and intrapleurally and another case caused by staphylococci (albus and aureus) was treated only by the intrapleural administration of from 25 000 to 50 000 units of penicillin in 100 to 200 c c. of sterile saline solution The instillation of penicillin was preceded by thorough aspiration of the pus

One patient who suffered from a py opneumothorax secondary to ostcomyelitis of the sixth and seventh ribs yielded, on aspiration, 150 c.c. of thick, greenish foul pus which on culture revealed the proteus vulgaris and the staphylococcus aureus Treatment consisted of sulfadiazine given orally and repeated irngations of the pleural cavity with a 1 3,500 dilu tion of fresh aqueous asochloramid. The Patient's tom of item aqueous normal after 9 days and he made a rapid recovery within the next few weeks ARTHOR J LESSER, M.D.

# Healy M J., Jr and Katz, H. L.; Penkcillin for Empyema. J Am H Att., 1945 128 568.

Five patients with empyema were treated with aspirations and intrapleural instillations of penfullin aspirations and intrapartition ranged from 35,000 The average durage of period and 35,000 to 50 000 units in 100 c.c. of sterile saline solution to 50 coo units in the pleural cavity after which was instilled into the pleural cavity after which was instined into the pus and occasional sites thorough aspiration of the pus and occasional unga thorough aspiration of the pussion. The procedure was tion with sterne same sense days and the dratton of treatment depended on the clinical response Pa of treatment depended on the unresolved. Pa tients who were complications received also an aver monia or other complications received also an aver monta or other companies of penicilla by the age of from 30 000 to 25 or an intermediate to the pen intramuscular route. Culture of the pen invested intramuscular stambulococcus aurem Livesled inframuscular route
the nonhemolytic staphylococcus aurem in revealer
the nonhemolytic staphyloc the nonnemory are type 3) in r case, the potential the pneumococcus (type 3) in r case, the potential the pneumococcus (type 3) in r case, the potential type 3) in r case, the potential type 3 in r case, the potential type

lytic streptococcus in a case and mixed infection of the nonhemolytic streptococcus and the hemolytic

staphylococrus aureus in r case

It is stressed that the treatment abould be instituted at the eathest possible moment and that ther apy need not await the results of becteriological culture since the organisms commonly causing emprems are susceptible to penicilian. Thorrecentesis should be performed at the lowest point of the cavity with a large gauge needle (15 or 17) perferably under fluoroscopic control and should be repeated until no pus reforms but a small smount of thin, sterile serous fluid is absorbed by the patient in a shoult time.

The acute episode of empyens was well controlled in all 5 cases. One patient suffering from an exten sive empyems, had an acute flare-up after arrest of the disease for four months, which again was promptly controlled by penicillia. However, in this case extensive pieural thickening made further sur gery advisable, in order to obliterate the chronic cavity. Three cases showed only a minimal amount of pleural thickening as evidenced by roestgenograms, while I case showed not thickening at all. The vital capacity in all 4 cases was undiminished and all 4 patients returned to active military duty within a few months. Armus I Lusars. M D

## HEART AND PERICARDIUM

# Resce C. D: Heart Injuries; a Report of 3 Cases Terms J. M. 045, 41 6

Injuries of the heart are usually penetrating kuife and bullet wounds of the chest and beart. The searcity of cases of nonpenetrating heart trauma in the literature leads one to believe that it occurs rarely. This article was published to arouse in terest in traumatic cardiac lessons and to stress the importance of considering possible injury to the heart in all cases of penetrating chest wounds, or direct or indirect traumat to the heart and great vessels in the absence of visible external damage to the chest wall. If we are looking for cardiac injuries we may find those that occur and discover that they are not as tare as suspected. Fortunately most chest contusions produce few functional disturbances, and

those produced are usually not recognized. We usually consider the thorace cage a perfect armor for the heart and believe the heart to be immune to the usual injuries to which the rest of the body is subjected. The heart, however lies behind the sterame butterseed against the thorace vertebrs, and is vulnerable to compression forces applied to the chest. Brady and Kahn have emphasized that no prognosis of a traumatic heart case should be given without considering the following (1) the physical and psychic condition of the patient prior to his injury (3) the type site and severity of the injury, (3) the immediate effects of injury both objective and subjective (4) the brighing symptoms "(5) the time interval between the injury and the ampearance of the discusse and (6) the diagnost

of the disease ats mode of onset, the site of injury and its course. With penetrating wounds of the chest one should suspect heart tamponade the signs and symptoms of which are (r) the patient is namedly free from symptoms for several minutes after the wound has been received (able to walk several blocks r fight on) (s) external bleeding stone as the tamponade forms (s) marked circle tory collapse, which is out of proportion to the blood lost (a) distant heart sounds muffled and west (slushing may be heard) (s) weak or absent pulse (6) low arternal blood pressure, (7) raised venous pressure (from 200 to 300 mm, Hg) with prominent strutted neck veins (8) fluoroscopic examination shows diminution or absence of cardiac pulsations (comet heart) and (o) marked dysones, pallor evanosis, or unconsciousness. As heart tamponade is the most common cause of death in heart infuries. the clinician should be able to make the diagnosis and administer conservative emergency treatment. The treatment of penetrating heart wounds as directed by the United States Army is (1) to asolrate blood from the pericardium (a) to repeat this if there is recurrence and (s) to operate if another recurrence takes place.

If lateral chest pressure is applied, ribs are frac tured but the heart is rarely damaged. Posterior chest pressure rarely causes any heart damage but anterior I ree will do so. The force received by the nationt depends on the size and weight of the object and its momentum. Anterior and posterior appli cution of force r compression of the heart may cause injury to any chamber of the beart. Bright and Beck believe that all chambers of the heart may be injured by direct trauma. Bilderbeck believes that one possible cause of heart runture is a sudden compression of the right auricle which becomes engarged because the patient holds his breath to deep inspiration just before a blow is received. White and Glendy believe the heart-chamber dutention at the end of dustole or early systole is important in heart rupture. Lewis states that with deep inspiration and a closed glottis the heart di lates markedly and remains in this state as long as inspiration is maintained. The right auricle is most susceptible because of its anatomical relation to the anterior chest wall. This was confirmed by Goolev in whose series 3s cases showed an injured right anricle. The left ventricle is placed deeper in the chest, is better protected, and is a more robust, stronger muscle than the auricle therefore, it cacapes injury it was damaged in only 1 case. The left auricle was injured in 16 cases and the right ventricle in only 4.

Children and young adults are more likely to have heart damage without external evidence on the chest. Parbologists say the chest wall really inpured in these cases if care is taken to look at the inner supect where hemorrhage may be found in the interspaces. Persons in middle life do not have heart injuries without damage to the chest will. Coronary thembosis due to traums to the chest is per er found an children and voung adults ( r mary thrombosis is found so older people as it i a tisease of mkidle life and of older people with athere edetoris.

In injuries of the lower one half of the sternum and the adjacent sixth, seventh eighth and ninth nos on the right side we may expect to find hema tons of the right suricle and injury of the inferior rose cava, diaphragm and liver with immediate death. If the upper half of the sternum with or without the adjacent ribs is damaged there should

be annenlar damage Samedon of heart injury with fluoroscopic exami sation electrocardiographic studies and careful follow-up should lead to the diagnosis of more cardiac injuries. Beck mentions that the developnest of the tie tac rhythm is suggestive in suspected

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Table 1

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asa. The author presents 3 case reports of cardiac in my The first was a ruptured aorta originating at a thy atheromatous plaque at the right posterior sortic sinus in a twenty-six year-old male who was straining to lift a very heavy weight. It was be hered that the original tear extended through about half the thickness of the media as this patient did not de until five days after the initial injury when he addenly developed cardiac tamponade from a

bemorrhage into the pencardial sac. The second case was that of a twenty seven year old negress who was stabbed in the chest she re overed from her initial injury only to develop a large aneurysm of the heart presumably from dam age to the anterior descending branch of the left turnary artery. She died because of the heart condition nine months after her initial injury

The third case was that of a forty four vear-old white female who developed myocardial insuffi dency and died four years after undergoing ex tenuve x ray therapy over the heart for a breast tumor on the left side The pathological examina tim revealed an x ray myocarditis with atrophy of the beart and chest wall

ROBERT R. BIGGLOW M D

# ESOPHAGUS AND MEDIABIINUM

# Vision, P. P.: Incidence of Esophagesi Disease in hegroes South M J 1045 38 452

Comparison of the relative frequency of the occur tence of diseases in various races has always been an interesting study At times variation in the incidence of diseases has been attributed to racial characteratics when environmental and economic conditions may have been the determining factors in other instances apparent dissimilarity in the oc currence of certain diseases may have resulted from difference in the density of population of various

The study of the comparative incidence of exopha real disease in white and in negro patients was prompted by a letter of inquiry from a colleague in an Army hospital concerning a negro whom he had

RACIAL COMPARISON OF THE INCL TABLE I DENCE OF PROPRICE AT DISPASS AT THE MEDICAL COLLECT OF VIRCINIA HOSPITAL

REDICKL COLLECT OF	(IRC that the same of	
1936-1944 Name of Discuse	Number of White	Patients Negro
Cardinoma Cardinopaum Diverticulum Dysphagia functional or	67 55 13	14 16 0
hysterical Esophagits Foreign body Heraia Miscellaneous lestors Lolypeass Strictures Congrellat	0 4 102 63 4 1 29	1 0 40 4 0 0 32 3
Varices Acquive esophagoscopic estaminations Total Grand Total	30 303	11 130 523

found to be suffering from cardiospasm. Previous experience and review of the available literature had suggested that cardiospasm was rarely encountered in the negro race

It seems therefore that lesions of the esophagus which may have their origin in congenital abnormal ities are encountered more frequently in the white than in the negro patient whereas other lesions ex cept cicatricial stricture of the csophagus which usu ally results from swallowing a solution of it e occur with equal frequency in the negro and in the white person in accordance with the density of population

Recent studies have suggested that congenital de formities which occur more frequently in white than in negro people may be related to the Rh factor as this factor is universally present in the latter race This factor may be the reason for the interesting dif ference in the occurrence of certain csophagesi lemons in the negro and in white persons which is difficult to explain otherwise

BUNJAMIN GOLDMAN M D

Smithers D W t Short Esophagus (Thoracic Stomach) and Its Association with Peptic Ul ceration and Cancer Beil J Radiol 1945 18:

The increase in the number of cases reported as congenitally short esophagus has followed the rec ognition of the association between this condition and peptic ulceration of the esophagus Two main conflicting theories have been put forward to ac count for the frequent association of partial thoracic stomach with peptic ulceration of the lower end of the csophagus One theory suggests that a congeni tally short esophagus is comparatively common and by causing relaxation of the cardia and a reflex flow of gastric juice leads to peptic ulceration. The other suggests that peptic ulceration of the couphages is the primary condition and that scarring and contraction resulting from healing pulls part of the atomach into the thorax. One theory puts a congeni tal defect first and the ulcer second while the other theory puts the ulcer first and an acquired defect second.

The following theory is offered by the author in an attempt to account for the relationship between par tial thoracic atomach with the roentgenological appearance of shortening of the cooplagua and personance of the cooplagua and pers

tic ulceration of the esophagus

1 Congenitally short esophagus is rare being seklom found at autopsy. Many cases so diagnosed during life have an acquired or an apparent shorten lng rarely demonstrable after death. It results from hiatus insufficiency, sometimes developmental, but more often acquired in later life.

2 When the cardiac sphincter in the thorax is released from disphragmatic control, gastric juice tends to flow into the esophagus and predisposes to

penticulceration.

3 Irritation of the esophageal mucosa by gastric juice (or probably by esophagitis from any cause) may produce irregular spasmodic contraction of the I were not I the evol largus which frequently occurs from sade to side, but is a longitudinal contention is shortening. In cases with an esoplagus of normal length the relaxation of the contraction and regalization of the pressure in the thorax and abdomen returns the hemisted portion of the stomach to the abdomen by the time that a postmortem examination is nefformed.

4. Heterotopic gastric mucosa may accrete gastre judice into the sepatagus or the gastric contents may reach it in other ways (for example, as the result of vomiting rummation, or relaxation of the cardia following operations) in patients without a lar his tus. Peptic ulceration of the esophagus may occur in these patients without renteroolocide underections.

of shortening of the esophagus.

This theory (first, histus insufficiency congenital or acquired, and second spassmodic shortening of the esophagus and ulcer) accounts for the known facts and overcomes the chief difficulties associated with the congenital short enophagus and "fibrosis and contraction" theories.

Two cases of short esophagus and cancer are added by the author to those previously published.

JOSEPH K. NARAT M.D.

# SURGERY OF THE ABDOMEN

### ANDOMINAL WALL AND PRRITONEUM

Cales, J. S.: Operative Cure of Inguinal Hernia in Infancy and Childhood. Am. J. Surg. 1945, 69 366.

In considering inguinal herman in the young one desh principally with indirect hernias since direct bemlas are rare and constitute less than I per cent of this group. In order to consider adequate surgical testment one must be acquainted with the embryo ispeal development of a preformed indirect sac. The processes vaginales an evagination of peritoneum spears at the site of the future internal ring at the thri month of fetal life and soon emerges through the anterior abdominal wall From the fourth to wreath month, it enlarges while the tester has in the fine four near the unterior abdominal wall close to the pelvac brim. From the seventh to the math month, the testis descends through the inquinal ami into the acrotum behind the advancing procases. The testas after entering the scrotum be come incompletely enfolded by the processus but the tunica vaginalis that portion of the processus his in contact with the testis has a cavity directly continuous with the perstoneal cavity. It is believed that the sac remains patent in from 30 to 50 per cent of the infants at birth. Normally this processus bromes obliterated from the internal ring to a short detance above the testis. The obliteration is aided the pressure of the abdominal wall and there is solification of the processus to form the funcular Cament

There are several possibilities if obliteration does not occur completely (1) if the processus and lamca remain open the abdominal contents may use and form a herms to the lower pole of the tests the so-called congenital herms (2) if the pocessus closes from just above the tests to a short feating below the internal ring the abdominal outleast may enter and form an 'acquired herma' outleast may enter and form an 'acquired herms'

and (3) if the processus narrows but does not obliterate at one or more points from just above the tests to a short distance below the internal ring a hydrocele of the tunica waginalis or the cord with or without an apparent herms may develop the socalled congenital hydrocele.

If the abdominal contents fail to enter the open processus in any of these types the processus will gradually be obliterated in many cases. The in guidal canal is so constructed that if there is no patent processus vaginalis it is impossible to produce an indurect herma regardless of the force exerted. In infants the internal inguinal ring is postenor to the external, the thickness of the abdominal wall being the length of the canal. With growth the internal ring is curved upward and out ward which makes the canal longer and more oblique. This results in an increasing resistance over the inguinal canal with straining

That the indirect inguinal herms is of congenital origin is emphasized by (t) the fact that the vas and blood vessels of the cord have a uniform relationship to the sac, and (2) the fact that indirect inguinal herms is more frequent on the right side. The later descent of the right tests is apparently related to this factor. The later descent of the right tests is compensated by its final higher position which equalizes the time of obliteration on the two sides. However if the difference in the processus of the two sides were enhanced a greater frequency of right indirect hernias would be expected.

Since 1038 the author believing inguinal hermus are due only to the presence of a preformed sac, has retinquished the common hermal repairs and relies only on a procedure isolating and lighting the neck of the sac. He believes that he obviates testicular strophy by not transplanting the cord with the danger of compression of the cord vessels by not delocating the tests from its bed which causes postoperative swelling of the tests and by not de-

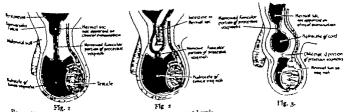


Fig. 1. Hydrocele of the tunion reginalis without an apparent herais.

Fig. 2. Hydrocele of the tunion vaginalis with an ap-

parent hernia.

Fig. 3. Hydrocele of the cord without an apparent hemia. (Courtesy of American Journal of Surgery.)

#### GASTROINTESTINAL TRACT

Hamilton J B.: Gastric Volvulus and Other Abnormal Rotations of the Stomach Result 015 54 30

Gastric volvulus is an abn rmal rotation f the stomach. Schatzki and Simrone point out that any position change of the stomach must be some form of rotation and this per se is not necessarily volvulus They cite as examples the high lying stomachs of obese individuals or the upside down appearance of the high stomach commonly associated with even tration of the diaphragm. However, true volvulus may occur in the presence of eventration

True rastric volvulus is considered to be present when rotation of the stomach reaching or closely approximating 180 degrees is present. tancously reduces itself or a reducible by manipu lation. It can reasonably be assumed to be the result of insury. Other abnormal rotations which are not subject to reduction either spontaneously or manually are believed to be variations on a basis

of congenital anomalies

There is a conflicting terminology of classification of gastric volvulus. Singleton says that "gastric volvulus may be defined as an abnormal anterior or posterior rotation of almost all of the stomach about either the coronal or samital axis of the body The stomach is limited in mobility between the gastrophrenic heaments above and the pentoneum covering the second portion of the duodenum below According to the length of the gustrobeputic omen turn the stomach may be displaced within these limits by extrinsic pressure. Therefore, pressure displacement is very common but true rotation of the stomach is relatively rare and requires unusu ally long gastrohepatic and gastrocolic mesenterses to allow its occurrence.

Singleton classes volvulus as

I Oreano-axial rotation of the stomach upward around the long axis of the stomach i.e. the coronal plane.

a Mesentercarial rotation of the stomach from right to left or left to right, about the long axis of the rastrobenatic omentum. This second type is called torsion or twist of the stomach by others namely

Becker Shanks Kerley and Twining

In acute gastric volvulus the rotation is so great that the blood supply is disturbed and immediate surgery is indicated. A series of cases is presented with characteristic x ray findings and interesting clinical pictures. One case was of a torsion type volvulus 6 cases were of the organo-axial type of volvulus I case was believed to be of the organoaxial type and a cases showed abnormal rotations which were constant and associated with eventration of the dasphragm. Acute gastric volvulus was not present in any of these cases.

In a case the excessive degree of twisting was shown by the pattern of the rugal folds and the bulb position. The spontaneous reduction was char acteristic of a diagnosis of torsion volvulus. In obese individuals a somewhat similar picture is presented by normal high-lying stomachs. This is differen thated from a torsion volvulus by the minor twisting of the rugal pattern and the normal bulb position. The difference between a gastric volvulus and a cascade stomach is emphasized

Relaxed intra-abdominal attachments are be lieved to have been present in all cases presented. Obesity trauma marked weight loss preceding gastric rotation, and increased intra-abdomnal pressure associated with obesity and anomalous development are some of the varying factors in the etiology of abnormal gastric rotations. A large re dundant or abnormally situated colon was a feature in several cases of true volvulus. Eventration of the left hemidiaphragm was present in 3 cases and a true volvulus was associated with it in a case. Hernlatton of the diaphragm, I case due to trauma and I in an obese patient, was seen in a cases of volvalus. An unusual congenital variation, a thoracic stomach on the right side congenitally hermated through the foramen of Morgagni, was also reported.

Symptoms, while not characteristic, were present

in all but I case. These were discomfort or pain in the epigastrium. Six patients had nauses and romit ing Hemstemesis and positive results of the benzidune test of the feces were found in 1 case. Only 2 patients had marked weight loss associated with gastric rotation. In several cases of true volvalus there was a history of similar attacks previously with s complete remission of the symptoms between the

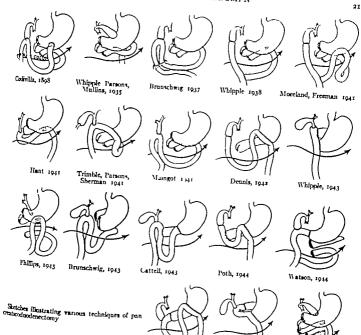
attacks.

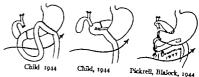
The characteristic findings in various rotations of the stomach are described and illustrated. They are usually best seen in the upright posteroanterior position before the fluoroscopic screen. It is obvious that in cases of true volvulus the finding may be missed unless the patient is examined during an attack. The differential diagnosis between eventra tion and hernistion of the disphragm is important since in the presence of herniation a repair of the diaphragm may both relieve symptoms and cause the stomach to return to its normal position. In carefully selected cases it is possible that surgery may be helpful in restoring the stomach permanently to a normal position with relief of symptoms. ROBERT B. BRAZIOW M.D.

### Orr T G: Pancreaticoduodensctomy for Cardnoms of the Ampulla and Ampullary Region. Surgery 1945 8 144.

Pancreaticoduodenectomy for carcinoma of the ampulls and ampullary region is discussed by Orr under six different headings. In addition, he has tabulated or listed the 32 additional cases reported in the literature from April 1 1942 (date of Whipple's report) to November 1 1944 In this listing he gives the author the date reported, the age and sex of the patient, the type of operation, and the results

I The first of the six headings comiders the dask nosis at operation. This may be most difficult because chronic pancreatitis or benign adenoms "may





to closely simulate carcinoma that a diagnosis made by palpation alone may lead to a needlessly serious operation." In selected doubtful cases duodenotomy tadblopay of the papillary area may be indicated, or a boosty of the lymph nodes or pancreas may be ad rable. If the diagnosis is not clear after a biopsy of the papilla, lymph nodes or head of the pancreas, n a wie to plan the operation in two stages and complete the second stage after a positive diagnosis of operable carcinoma is made.

There has been no accurate publication of the and results of pancreaticoduodenectomy and until a circlus of pancreaticoduogenectomy and a circlus study has been made, it will be difficult to tate with an) degree of accuracy what percentage of cures may result or what the average length of life

will be following this operation. It is also difficult at present to compare and draw conclusions from the results obtained by the palliative operation, the transduodenal resection, and the radical operation. But regardless of the lack of knowledge concerning the final results the radical excession of a carcinoma arising in the ampullary region by the Whipple type of operation fulfills the requirements of cancer sur gery in general and offers the greatest hope for the greatest number of cures in the future.

3 After reviewing the experimental and some of the chnical reports on restoration of the external pancreatic secretion Orr asks Ts there any good reason why the end of the divided pancreas should not be united with the intestinal tract?' Then he

answers. Until this justion can be answered an unoqualified opinion concerning the advasability of restoration of the external pancreatic secretion following pancreaticoduodenectomy cannot be given. However one can state with assurance that it is a physiological procedure to restore the external pan creatic secretion of the intestinal tract.

A The one-stage operation is preferable if the general condition of the patient will tolerate such an extensive and prolonged procedure with reasonable safety. The earlier that patients with perampulary curcious come to operations after the onset of symptoms the greater the number that will be suitable for the one-stage operation. There will be a relatively large percentage of deeply jaunduced and generally debitiated patients for whom the two-stage operation must be chosen. The first stage of the planned two-stage operation has a sufficiently high mortality to warn the surgeon that the choice of operation must be very carefully made.

5 The chorce of technique should be guided by the fact that (1) sufficient tissue should be removed about the tumor to include any local infiltration of the tumor and the regional lymph nodes (2) the common duct should be used for anastomosis when ever possible instead of the gall bladder (this will facilitate drainage of the bile and prevent leakage of the bile from the ligated common duct) (3) the anastomoses between the gall tract and pancreas and the felunum should be made proximal to the gastrofeiunostomy to prevent salection of the gall tract and pancreas and (4) anastomosis of the pancress to the ejunum should be made to prevent pancreatic fatula and to restore the external pancrestic secretion to the intestinal tract. These principles are incor porated in the operation of Whipple Poth, and Child.

6 The author has had 18 cases under personal observation. A study of these brought up the question of the possible operability and cumbating of such patients. To estimate the value of say operative treatment at its reasonable to include all outlents having the disease. Of the first group of 9 patients 1 deef following the instatege of the operation, and died on the operating table at the beginning of the second stage. Two patients had palliative cohecytogramications because of extendive metastases. A clinical diagnosis only was made in 5 cases. In only 1 of these was surgery recommended. Of the 18 patients 11 had proved metastases or clinical evidence of metastases. The frequency of metastases in this small number of cases makes one wonder just what percentage of such patients a curable by successful pancest identications.

Survey J Footstoon M.D.

Brandberg, R.: Obstruction following Gastric Resection and Gastroenterostomy Asia ki at d 045 92 37

Difficulty in emptying the stomach contents into the intestine occurs quite frequently after gastric resection and gastroenterostomy but, generally recovers as spontaneous without any radical treat ment. These temporary obstructions are due to gastroenteric atom? Other causes of obstruction are mechanical or due to distention paresis caused by the operation.

In resection by the Billroth I method, senous obstruction may be caused by distention of the stomach wall at the site of the suturing of the re sected surfaces Therefore this type of resection should be used in only a limited number of oues The common cause of obstruction in antecolic long loop gastroenterestomy with or without resertion. is that too short a loop has been used for the matiroenterostomy and as a result the afferent loop becomes too much distended and, therefore, paretic The stomach empties into this paretic loop while there is little or no emptying into the efferent loop. The loop in this type of gastroenterestomy should be at least 50 cm. long. The same cause may lead to obstruction in posterior short-loop gastroenterostomy with or without resection, but the commonest cause of obstruction in this type of operation is abnormal shortness fibrous thickening, or high fat content of the mesocolon. This causes so much pressure on the gustroenterestomy loop that it cannot be overcome by the comparatively slight motility of the loop. If there has been a large resection the mesocolon may be pulled up so much that it compresses the gastroenterestomy loop and results in obstruction. All these changes cause distention and paress of the afferent loop with the result that the stomach empties into the afferent instead of the efferent loop. Therefore, posterior gastroenteros-tomy should not be used unless the mesocolos is completel normal U it shows any abnormality anterior matroenterostomy should be performed Severe obstruction can almost always be prevented by choosing the right type of gustroenterostoms

by choosing the right type or gastroenterovaming. If obstruction occurs after a few days of satisfactory emptying it is apt to be caused by inflammation or adhesions around the gustroenterostomy opening.

Temporary obstructions may be releved by repeated wishing of the stomesh or permanent suction, associated with the parenteral administration of sodium chloride and placone solution, and in some cases the transfusion of blood. In severe and long-continued obstructions caused by distention parents with changes in the mesocolou and the low mation of admissions a jeptoustomy must be performed for the purpose of feeding the patient. In the majority of cases the obstruction is overcome spontaneously and it is not necessary to perform any of the operations for abolishing it these operations for abolishing it these operations for abolishing these operations for about 200 miles of the contract of the c

Ten Kate J The Technique of the Billroth 1-Schoemaker Gastrectomy 4ds the scend 944, 90 13

Billroth performed the first successful resection of the stomach for cancer in 1881. In his first method,

alled the Billroth I the duodenum was anastomosed to the stump of the stomach at the greater curva ture, the part at the lesser curvature being closed. It was soon found that this method involved serious mis because of tension on the sutures particularly at the "latal auture angle where three sutures met Elleth himself gave it up for his second method the Billroth II but Schoemaker modified the Bill mth I method so as to free it of its greatest danger He miroduced a curvalorm incision of the stomach The antrum is resected together with the greater part of the lesser curvature and the beginning of the doodenum a tube is formed from the part of the stomach lying near the greater curvature. This is a uncal method and yet it economizes normal gastric tame. The gustric tube is long enough to be united to the duodenum without any tension 1 special camp to be used in the performance of the operation ru devised This clamp and the various steps of the method of operation are illustrated in the orig imi erticle.

The author believes that with the Schoemaker modification the Billiroth I method is possible in any pattectomy In penetrating duodenal ulcer with an militated wall, the Billroth II method or a gastromicrostomy is preferable on account of the danger of recurrence. Modern surgical methods are deter amed more by physiological than by anatomical maderations and the author believes that Billroth hanell would now use his first method of operation is preference to his second one

AUDREY G MORGEN M D

Sanders, R. L.: A Review of 101 Subtotal Gastree tomles for Benign Ulcer Surgery 1945 18 229

The for subtotal resections upon which this study a based were performed during the past 11 years hom 1933 to 1944. There were 13 patients with gas inc, or duodenal and gastric ulcers in of whom are operated on from nine months to nine years ip Ten, or 90 per cent, obtained a good func unal result and were free from their former ulcer imptoms The eleventh patient died of pulmonary embolism on the third postoperative day

Of the 80 patients with uncomplicated duodenal ther of were operated upon primarily and in ro the resection followed a previous operation for the ane condition. Of the or with primary resections ided, a mortality of 17 per cent this incidentally, and the first patient of the series, who was operated apon in 1933 Of the remaining to patients 50 were operated upon more than one year ago and 48 of the have been heard from since 33 reported an excellent result with good stomach function and complete relief of their distress an additional to tre materially relieved although they still have some minor disturbances such as mild nauses and romiting after breakfast or some weakness or stubborn weight loss These 43 patients thus represent so per cent of the results which may be classified as exclient or the results which has so experimentely s per cent have clinical and roentgenographic evi-

dence of a recurrent ulcer at the stoma. Of the 19 who underwent secondary operations 16 came to surgers more than a year ago. Three of these have some slight nauses and the others report complete relief with a good functional result.

The remaining 8 cases were instances of gastrojejumal (6) and of colonic fistule complicating gastrojejunal ulcer ( ) All of these patients were operated upon more than I year ago and I of the patients with a colonic fistula died 6 patients have obtained an excellent result, having no symptoms and a patient has only occasional nausea. Therefore there were good results in 87 5 per cent of this group of 8 patients undergoing secondary operations and a total mortality of 3 deaths or approximately 3 per cent for the 101 resections In view of the nature of the operation and the fact that many putients with these lessons have associated disease which ma terially increases the risk, these results are certainly commensurate with those of other abdominal procedures of similar magnitude and explain in part the continued and increasing preference for this type of operation in the conditions here reported author states that they have had no deaths resulting from the resections in these cases for the past

The author also classifies his patients into groups particularly his patients with primary resection for duodenal ulcer from the standpoint of the pathological condition found at operation and the relief to be expected from the operation. For instance, 17 or 34.7 per cent of the patients who were operated upon more than 1 year ago had a bleeding posterior ulcer (7 of them with an associated anterior ulcer) 13 of the 17 were completely relieved and 4 were partially relieved Thus the entire 17 or 100 per cent were benefited by the operation. The second group consisted of 6 patients who underwent resec tion for pyloric obstruction, the usual pathology being a posterior duodenal ulcer of long standing although in 2 of the author's patients again there was present also an anterior ulcer. Five of these 6 patients have remained entirely free of symptoms after resection, but I still has some names with vomiting of bile at times In the remaining group are 26 patients who underwent resection for intractable pain here again the causative factor seemed to have been a posterior duodenal ulcer eating its way into the pancreas however in 16 of these cases an anter for ulcer was present as a complication. Of these 26 patients 15 were completely relieved and 5 partially relieved 4 continued to have considerable discom fort, I developed clinical evidence of a gastrojejunal

Although this series is small it shows that the author's experience is similar to that of other sur geoms in that obstructive ulcers of the duodenum have been found most amenable to cure that resection for bleeding ulcer may be expected to give the next best results and that the prospect of com plete relief is somewhat less certain for intractable JOHN W BRENNAM M.D.

Luna D F., and Arnedo, F. C.: Healing of Tuber culous Ulcera of the Intestine (Curación de las ulceras inberculous del intestino) Rev Ar midargest 945 39 634.

About 19 per cent of tuberculous patients die of intestinal lesions which complicate the polyopary disease. It is therefore, of great importance to care the intestinal lesions. They begin as a submucous tubercie which undergoes easeation softens empties into the lumen of the intestine, and leaves an ulcer They are called simple ulcers if they affect only the submucosa penetrating if they affect the muscular layer and perforating if they reach the subserosa. Naturally the shallower they are the more reachly they heal It has been shown that spontaneous healing does occur The stages in healing are gramulation of the ulcers and epithelization. Sometimes new corthelium is produced in excess. If muscle has been destroyed it is pover regenerated. Even if the ulcers heal, a break in the continuity remains in the muscularis mucosae marking the oneinal extent of the ulcer and a gap in the muscle layer which is filled with connective tissue. Stenous from dostrigation of ploets has been reported but the authors did not we am cases of it in 720 autopsies 450 of which were performed systematically in a search for such lesions Among these 18 ulcers in the process of healing were found.

A detailed histological description is given of the different stages of besling and libustrated with photographs of the surgical specimens and photometrographs of the histological finding. The process of healing may be histoned by various treatments such as nitraviolet rays and cod-diver oil and orange juice. Spenier Wells was mistaken in reporting that they dieers could be healed by exposure to air. be based this statement on a simple exploratory largar rotomy in a case of tuberculous ulcers of the intestine after which the ulcers healed.

AUDRES G MORGAN M D

Kock W Primary Surroms of the Small Intestine (Primare Duemodarmsarkome) ld kl sc nd 1043 80 37

Se enteen aeromas of the small intestine are reported from the records f the large surgeal clinics in Stockholm covering the years 1900 to 1911. Most of these tumors were undlagmosed until memorard by autopay or operation however in 8 patients a tumor could be determined by palpation or with x-rays.

The Int I thee properatively diagnosed cases was that of a in- of 16 years who had suffered for almost a vear of recurring attacks of abdominal pain and distention its piece and anoreus. Physical extendiation in this instance decided large series of localized resistance with knobby extensions up tward the liver.

The second example we that of a soldier of 42 cars who had suff red for about 2 years with at tack f colle, constipation and flattence, and frequent attacks of dysuria. He himself had noted a

knob the size of a goose egg, in the right iliae regin, and on physical examination there was palpable a mass the size of a first extending from the symphy six to the mayel.

The third patient, a man of 27 years had symptoms which began as attacks of colic and durrhes, with loss of weight later there was detectable in the right side of the abdomen a rapidly growing tumor

The fourth patient a female of 66 years had always been anemic and a years previously had had attacks of diarrhea z year previously she had sof fered fever vomiting, colicky pains, and meteorism. Since then there had been attacks of persistent diarrhes the patient had become pule and cachetic. and the stools evil smelling. Examination in this instance disclosed a mild anemia cosmonhilia, and an occasional positive Weber reaction. The right hypochondrium looked fuller than the left, and di lated loops of bowel could be palmated. Roentgenological examination in 1000 the first in this series of 6 patients wherein the x-rays were mentioned showed a walnut-sized shadow-defect on the horder between the rectum and sigmoid. With oral administration of the contrast medium there was disclosed a delayed, obstructed emptying of the small bowel and adhesions between loops of the small miestine.

The fifth clinically diagnosed patient a 51-year old female had suffered acid eractations for many years and for the past few weeks had been unable to tolerate highly sensoned and fatty foods-she had experienced frequent attacks of postpraudial vomit ing and colicky pains from a to a hours after eating. She had lost much weight in the last half year A week previously this patient had noted a pi-m-sized, painless mass alongside of the navel. Examination disclosed a subfebrile temperature and indication of defense musculaire in the right epigs trium. There was a pulpable 1 rm plum-sized may pear the navel which seemed adherent to the lines alba-I rays revealed organic changes in the cecal pole and in the remon ( the iteal mbouchure into the eccum. Here the diagnosis was not decisive as be tween inflammation or tumor but operation confirmed the presence of a tumor which was clusically diagnosed as a sarcoma of the small bowel. In this case as in 3 others of this series the diagnosis was not confirmed by microscome examination of the operative or postmorters pecimens.

The sixth instance was that of a female 59 jears of age whose case may previously reported by M g mixton (4cta & m at 933 73 334 576) and who had suffered vague abdom not pains. The tentative diagnosis of tumor f the mail intestine war based soleh on the roenters findings.

The seventh case was that I a doy-servoid withow who had offered for several years with morted fatulence and color During the persons sead a medical citals had made a tental to dispute disputed appendicitis. Examination that closed appendicitis Examination the closed appendicitis and and a color and a signifyil distincted abdonce, and rectal inchings say

roling a tumor of the adnexac on the right side or of the colon (possibly merel) scybala) \ \rangle ray ex samation, however gave the findings of a space limiting process beneath and medial to the occal or the colon of the col

The eighth example was that of a male of 72 years she had suffered weakness and loss of weight for 3 meals before the tumor in the right illac fossa was noted since them he suffered at times of meteorism with shooming distinction. The roentgen examination of the wall of the eccum should be a sufficient of the wall of the cecum should be a sufficient of the sufficient of

In the remaining 9 patients in this series of small stestinal sarcomas, the symptoms and findings rue not greatly different from those of the 8 clinic ally diagnosed instances cited and indeed not great ly different from those postulated by the world Sterature on the subject. However all 17 cases are huped together by the author in an attempt to se one information on the frequency of primary sar comes of the small intestine in proportion to other miligrancies of this region. For instance during the same period (from 1900 to 1941) there were also brought to operation in the surgical clinics of Stock bolm, 23 instances of sarcoma of the stomach and 5 ares of sarcoma of the colon-together with a pa bent m whom a growth involving both the stomach and the colon was uncovered. As regards the inci desce with reference to the different sections of the small intestine itself there were 2 tumors involving the duodenum, 2 involving the jejunum 3 in the feum, 3 in the ileocecal region, and 7 reported for the small intestine as a whole There were no instances sported from the children's departments of the Sockholm hospitals the patients being otherwise hirly well distributed for age

Histopathological examination was reported in 10 of these 17 patients and the pathologicoanatomical fadings revealed were the flowing 1 round-cell fadings revealed were the flowing 1 round-cell success of the small-cell type 1 florosarcoma of the gnant-cell type 1 florosarcoma of the gnant-cell flowing 1 round-cell success as the small-cell flower flowing 1 florosarcoma of the reachin-cell type 1 hemangiosarcoma and 3 hm absenced type 1 hemangiosarcoma and 3 hm absenced flower flo

The data from this material is included in a table shoring the surgical methods employed. These nethods varied according to the exigencies of the intridual situation encountered and the results of ach treatment. The results are not especially en coraging and have apparently not improved greatly daring the period covered by this report. The author illuses the importance of preoperative and post scaling importance of preoperative and practice irradiation treatment none of these particularly in the particular in th tents however were treated by irradiation method lour to surgical intervention and the postoperative thucation are not claimed by the author to have brohoed any markedly beneficial effects. Except he the roentgenological advances the whole subject ignam to have remained about where it was a half century ago JOHN W BREXMAN M D

Arendt J. The Significance of Cannon a Point In the Normal and Abnormal Functions of the Colon. Am J. Reesig. 1945. 54, 149

The author has noted that frequently twenty four hours after the ingestion of barium and sometimes immediately after the expulsion of barium enemas the colonic pattern is divided into two distinct parts so that either the cecum ascending colon and prox imal portion of the transverse colon are widely filled with berium while the distal portion of the colon is contracted (Fig 1) or vice versa Occasionally however only a contraction ring was noted in the transverse colon. The site of the change from the wide lumen to the contracted one or the site of the contraction ring was usually to the right of the spine between the proximal and middle thirds of the transverse colon, and never much further distal than the middle third. The constance of the phenomenon has convinced the author that this point is of great He identifies this point with that of the contrac

the interest of the Cannon in cats, in 1902 and ton ring described by Cannon in cats, in 1902 and later in rabbits and in man by Boehm who allo observed different functions on the two sides tonic



Fig. Demarcation of Cannon's point (arrow) Weend in and transvene colon wide up to Cannon's point transvene and descending colon contracted beginning at this point.

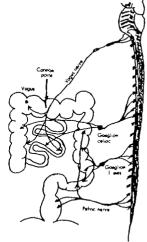


Fig a Schematic drawing of the co-ordinated o at times antagonistic colon innervation.

contraction and antiperestals in the proximal part of the colon, and deep segmentation with ball for mation in the distal part. A diagram by Garra showing the functional drivision of the colon at Camons point a established in animals by the experimental physicologists is reproduced and Cases early roentgen study of colon motility in man is recalled.

The author's contribution is his hypothesis that Cannon's point represents the plwoting point of a change in extrinsic innervation of the colon between the vagus and pelvic nerves on the parasympa thetic side and on the avmpathetic side between the splanchinicus superior and inferior nerves (Fig. 2). The precase point where such change occurs has long been in question although the general distribution in the colon of innervation from the various extrustic sources are well known. The point of change proposed follows well the colonic division as to the blood supply the proximal neurological unit of the colon heing supplied by the superior meaenteric artery and the distal part by the inferior meaenteric artery and the distal part by the inferior meaenteric artery.

If the nerve impube in ascendancy is the same type in both neurological divisions of the colon, no demarcation of the two units can be seen roentgenologically but if they are antagonatic, the devision is clearly withle. At Cannon's point peritatine waves tred to flatten out or revene themselves, the proximal part of the colon being the relatively quiet portion, while beyond Cannon's point the great drivine movements have their orien.

Diving movements have their origin. The author finds this concept of functional aningonism clinically significant, in that spatic contraction of the distal unit may be a cause of contraction in the sacending colon, and hence best treated by antispasmodic. It also offers an explanation of the antispasmodic. It also offers an explanation of the observations of Shoay and Vernet that kidney stone are often accompanied by painful spasm of the descending and transverse colon with constitution, of the companies of the distal neurological control and the blocking of the distal neurological colonic and that of the disease exclusion of its innervation and that of the colonic control of the neurological units of the colon has impossing of the neurological units of the colon has impossing in the differentiation of, and choice of operative method for the different trues of necessories.

III types of megacoson.

# Fackas, J \ Acute Appendicitis. Minames H

Farkas analyzes 665 cases of acute appendicits admitted to the Surgical Service of the Vinneapolia General Hospital over a five year period. All are cases of grossly and microscopically proved diseased appendix symiforms.

The ages of the patients ranged from two to sevents are years. There were 354 males (53 2 per cent) and 3 1 females (46 8 per cent). Despite this inequality in the overall figures there was a greater modenee of the disease in females in the sariler periods of the

There were two definite seasonal peaks, one in

mudwinter and one in midsummer

The duration of symptoms ranged from one and or half hours to seventeen days according to whether the appendix had not perforated (average 256 hours) had perforated (average 49.05 hours) or whether there was a definable mass present (average 6.1 days)

Six hundred and forty-eight patients were treated surgically Of the remaining 17 patients, 15 had definable masses and the drease apparently was notice adequate control, 1 was an eleven-pear-old grid who was extremely ill, with a temperature of 104 who expured after three days of hospitalization and the last was a seventy-six year-old man who was admitted to the hospital in a morthund state and expired the same day.

A McBurney Incision was done in 524 cases and a rectus muscle approach was used in 120 instances 79 of the patients in this group were lemales.

The tump of the appendix was inverted in less than half of the cases, and apparently there was difference postoperatively between those patients in whom this technique was employed and those in whom t was not utilized

Only in cases with abscess formation were drains used. Sulfonamides given orally or intravenously were administered postopic ratively in full therapeutic doses to patients with evidence of peritonitis

It is believed that the use of morphine prior is surgery was a helpful and in interpretation of the true pathological state because of the climination of muscle spaam

Spinal anesthesia was the method of choice

The hospital stay varied with the type of incision. Following the McBurney incision it averaged seven and three tenths days and following the rectus in culon, eleven and three tenths days whereas patents with perforation of the appendix were required to remain for an average of nineteen and four tenths days.

Bacterological studies when done were not remarkable the usual intestinal inhabitants (escherichia communis escherichia communior and non-

hemolytic streptococci) being found.

There were 13 (1 94 per cent) deaths 11 (1 95 per cent) of which occurred postoperatively. All of the latter occurred in patients who had had perforated acutely infected appendixes and generalized pertonitis.

Postoperative complications other than unnary retention included pulmonary acticetasts autophyreme abscess wound infections postoperative wound eviscention, and I large pelvic abscess. There were other complications which were not postoperative such as acute appendictits complicating pregnance acute appendicties complicating the purepersum and Meckel's diverticula. There were no deaths among this group of patients.

STUPBEN L ZUMAN M D

O'Connor, H. A. D. and Bessle E. M. Appendict tist A Survey of the Last 2 800 Consecutive Cases A Last State J. M. 1945, 45, 1535

The entireseries of cases presented is taken from the service of the senior author at the Brooklyn Navai Hospital and constitutes a completely unselected group of a oco consecutive patients operated upon for appendicitis from October 1944 to September 1944. The preoperative care aneathesis operative technique and postoperative management are de scribed in detail.

The authors believe that in these cases more at tention should be paid to the history and less to the physical findings and laboratory reports and that appendectomy should be done on the suspicion of appendicture rather than on the catalbished diagnosis. They recommend the free exhibition of the sulfonantides in adequate dosage given intra peritonesily with liberal use of the Wangenateen type of gastric drainage and of intravenous fluids and the adoption of an operative technique which make appendectiony relatively safe and simple even for the type of the contraction. The contraction of the type of the contraction of the contr

Ochaner A. and Johnston J H. Appendical Peritonitis. Surgery 1945 17 873

Cases of ruptured appendicitis admitted to the Charity Hospital, New Orleans in 1933 and 1943 were studied and analyzed. These two years a divarie apart were chosen because in the former group in sulfonamide drugs were enjik yed no attention was paid to plasma proteins and gastrointestinal decompression was inadequately used. The casewere classified in three groups in accordance with the type of complication associated with rupture of the appendix as follows: (1) generalized perstonits (2) [vealused perstonits and (3) localized abacers

The incidence of localized peritorilis was about the same in the two groups while the incidence of generalized peritoritis decreased and that of localized abscess increased in the 1943 group. A comparison of the treatment and results in the years of 1933 and 1943 indicates that the therapy now employed is more effective than that which was used formerly.

The use of sulfonamides has been a boon in lower ing the mortality and the morbidity but the use of large amounts of blood and plasma the employment of castrointestinal decompression, and the use of oxygen have been equally important. The combined mortality rate in all types of appendical pentonitis in the 1933 series was 15 per cent, and in the 1943 series was 5 2 per cent. In 29 patients with local used peritonitis admitted in 1943, there were no deaths in contrast to a mortality rate of 11 a ner cent in the 1033 series. In the patients with general used peritonitis the mortality rate in the 1933 group was 23 giver cent whereas in the 1013 group it was 14 2 per cent. There was no significant variation in the mortality rat a for patients with localized abscoss in the two series. The lack of improvement in the mortality statistics in cases of localized abscess is probably due to the meffectuality of the sulfons mide drugs in localised supportative processes These statustics demonstrate the necessity of in stituting drainage of localized collections of nus before sultonamide drugs can be effectual

A nies is made for careful study and individuals ration in every case of appendical peritonitis. The authors advocate (a) immediate appendectomy in all cases of unruptured appendicitis (b) unmediate appendectomy in all patients with ruptured appen dicitis in whom there is not definite and demon strable localization (thus, they believe in immediate appendectomy in the localized and generalized pentonitis cases of the diffuse type) and (c) conservative therapy in all cases of localized inflamma tory processes. This treatment consists essentially of obtaining absolute test of the gastrointestinal tract by withholding everything by mouth the liberal use of morphine the application of external heat to the abdomen gastrointestinal decompres-sion, the liberal use of blood and plasma to avoid anemia and hypoproteinemia, parenteral admini stration of sulfonamide drugs, and oxygen to aid in preventing distention. The authors believe that in 75 to 80 per cent of such cases the inflammatory process will quickly recede and that interval apnen dectoms should be done at a later date. In from 20 to as per cent of such cases localised suppuration

will occur and will require drainage. Creat car in avoiding uninvolved peritoneim in such drainage is imperative. Jon 1 Lindonist M.D.

Wiklander O Rectal Prolapse in Children. 1ctal

Rectal prolapse is much more frequent in children than in adults. Almost 90 per cent of the cases occur in children. The prolapse generally begins during the second year filife and there is a tendency

t ward spontaneous healing

The author discusses 48 cases treated from 192 to 922 About two-thriefs of the cases occurred in boys. Constitution is an important contributory cause having been seen in more than 50 per cent of the cases. However not enough attention has been paid to poor social and economic condutions in the causation of this condition. The majority of these children came from poor bomes in which they had been neglected and in more than half of the cases re examined treatment had been inadequate.

Because of the tendency toward apontaneous healing, treatment should at first be conservative. The child is kept in bed the diet regulated, and complete abdomnial pressure is avoided by allowing the child to defectite while lying down or sitting on a vessel with his legs hanging. If conservative methods do not give good results or if there is fear of recurrence from pegiect after the child goes home, operation may be used, although conservative treatment should be prolonged for at least a month before

surgery is used

The surgical methods most in use are those of Thierson and Ekeborn and striping by disthermy The results obtained by striping are as good as those from the other methods as permanent healing takes place in from 8; to op or cent of the cases Striping is recommended as the simplest and least dangerous surgical method. The prolapse is pulled forward and after about 6 longitudinal stripes are cleaned they are seared along the prolapse with a dathermy bulb up to and particularly at the transition to the skin. Then the prolapse is reduced and the child kept in bed for a week on a lazative det. If only longitudinal stripes are seared with a distance of s or 3 cm. between them there is no danger of stricture. Ampart G. Morance, M.D.

Blaisdell, P. C.: Traumatic Injuries of the Rectum.

J. Am. M. Art. 945, 28 559.

Rectal injuries commonly result in penneal complications due to the fact that these wounds tend to become fistulous. Thing one tecrated wound approximates a pen to the primary suturing of traumatic certain wounds constitutes potentially the most service wounds for principle. It has been proved that bealing has been delayed far beyond that of wounds left wide open from the start. Primary suturning may be responsible for fistulas which are totally incurable or an operation necessitating far greater mutilation for cure than if the wound was left open. Acute absects re a frequent intermediany stage between either a closed or a bridged wound and the final chronic fastula. This extension of pass under pressure may expand many times the limits of the original injury. The danger of inconthence by the prolonged separation of muscle ends through continued packing of the wound must be considered.

In injuries to the anal sphineter it is found that when the severed ends are left apart and no effort is much to bring them together, this area must be watched for bridging. It is believed that the transatically injured sphineter should be let alone to take full advantage of its own capacity for soon-

A colostomy is not a preventive of fistula Sub-

sequent unsound healing is due primarily to faulty wound architecture which is shown by the fact that the recurrence rate is so times greater in subtred than in open wounds. In the treatment of the intermediary abscesses the site of incision itself becomes part of the residual fatula.

Four cases of traumatic injury to the rectum are presented in abstract form, and in 3 cases mismanagement is charged.

RICHARD J BIDGETT JR., M.D.

#### LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Zacho, A.: Uremia in Lesions of the Liver and Bile Ducts. Ada hir seast, 943, 88 383.

It has long been known that there is decreased diurents in patients with liver disease. About the middle of the last century attention was called to the fact that in patients with liver disease. About the fact that in patients with the last century attention was called to make the last control of the last century which were considered secondary to the liver lesions. Not only retention of vater is found but also in creased blood ures, acidons and the presence of parenchymatous lesions of the kitherys although the latter may be slight. Such lesions occur not only in liver disease but also after operations on the blie ducts more frequently than has been believed. In severe cases the patient may die with the clinical picture of uremia.

Thirteen cases of urema occurring in diseases of the liver and bils donts are described. Tables and graphs in the original article above the course of the disease. Treatment must be directed toward improvement of the function of the liver and also of the kidneys particularly toward Increased diserses. Careful examination abould be made before any proposed operation on the liver or bile ducts is performed, and if kidney function tests are unsatisatively operation should not be performed. After operation, shock should be combated by blood transfusion. The patient who has had an extensive operation requires about 3 o 4 liters of water in a bours which should be given him by mouth as soon as he is able to drink. Gincose also should be given after the operation. Excessive use of asit aboution

may exist often a eyen edenia. I the lunes. If there is aridous an isot inic sodium blearbonate solution should be given at once intravenou it or subcutancon ly

The orognosis is bad. Only 2 of the patients in the series recovered. It is possible that some of the others might have been saved if treatment had been erven in time AUDRES G MORGAN M D

Narat J k. and Cipolla A F : The Fragmenta tion and Dissolution of Gall Stones by Chloroform. Arch Surg 1045 51 51

is a rule mechanical means are sufficient for the removal of stones from the behars tract. Therefore the field of usefulness of a chemical solvent is so limited that only two indications can be suggested

1 When a stone is firmly lodged in the common duct and cannot be removed manually when the surgeon is not certain that all broken particles of the stone have been removed or if the stone is firmly lodged close to the ampulla of \ater the use of a sol vent may obviate the necessity of opening the duo-

2. When a stone in the hensitic duct sline away into the liver in the course of attempts to remove it

mechanically

In such execumstances, injections of heated chloroform may be given a trial because this method apparently does not represent a therapeutic hazard To play safe it is advisable to use not more than 5 or 6 c.c. of the solvent and to pinch the hepatic duct during the procedure. In experiments in vitro as well as on animals the use of heated chloroform proved to be superior to ether as an efficient solvent of gallstones

Repeated injections of chloroform during the post operative period should be discouraged because they are not efficient and represent a potential barard

S MITL KARN M D

Visorl E. F : Four Cases of Acute Pancrealitie in Previously Cholecystectomized Patients. Remurks Concerning Recurrences in 46 Cases of Acute Pancreatitis (Vier Facile von akuter Pan reatiti bel orber cholecystektomierten Patlenten I iniges ueber Rezidi e in einem Material von 46 akuten lankrentitisi ellen) dete ehr mend 1943 88 220

At the time when radical treatment of pancreatitis was popular it was customary to remove the gall bladder in the course of the operation because rail stones undoubtedly represent the most frequent cause of nancreatitis. Cholecystectomy had the purpose of speeding up the recovery and preventing recurrences. Removal of the gall bladder was also advised in each case of cholclithmais to prevent the development of pancreatitis. However numerous observations showed that the expected results were not always achieved

The author reports 4 cases of acute puncreatitis in patients in whom the rall bladder had been removed from 11/2 to a years previously. He also reports 46 cases of acute pancreatitis. The material is divided into two groups cases treated in a conservative manner and cases treated by cholecystee tomy. In the last mentioned group the operation was performed on a nation is during an acute attack and on 3 patients during the interval. Two nationts who were operated on during the attack developed recurrences. In 23 patients treated in a conservative manner the condition became chronic and in 7 it recurred. The author concludes that no great differ. ence existed between both groups as far as development of chronicity or recurrences was concerned.

The author realises that his material is too small to allow any definite conclusions but nevertheless he is inclined to believe that cholecystectomy has no great prophylactic value in the prevention of JOSEPH K NARAT M D acute pancreatitis

# OBSTETRICS

# PREGNANCY AND ITS COMPLICATIONS

Zondek, B. Sulman, F. and Black, R.: Hormone Frennancy Test. J. Im. M. 1s. 1945, 1, 5 au

In an eff rt to determine a more rapid pregnancy test the author above worked with infantile fermale rats from three t ive weeks old and weighing from 20 t 15 gm. They have discovered that the lay percinia hormone pregnancy test is 100 per cent accurate in a twenty lour bour reading for the determination of pregnancy. But it is not as yet sufficient for the diagnosis of distorted pregnancy which in cludes ruptured extrautement pregnancy and threat need incomplete and missed abortion. There may be a 1 per cent error due to tumors in compregnant individual. The two- and six hour tests can be relied on if the results are positive.

The bormone pregnancy test is based on the following gonadotropic reactions of the ovan in infantile rodents anterir pituitary reaction I fallicle ripening and induction of varieties and rur printiary reaction II byperemission of the ovars and follicle bemorrhage anterior pituitary reacts nIII the formation of corpora but of our order and the formation of corpora but of the formation of the formatio

be used the rat is most fitting. The authors lengmated 1 hyperemia unit as the amount f gonal tropic hamone which induces hyperemia it is while ovary in an infantle rat within twenty four hours. Hyperemia is exhely maint by htteining hormone and fulled timulating hormone ha only an augmentative fleet. For the exact higgross. I pregnance, the right down important since the njection [excess | x amounts.]

f urine result in post i e reactions in nonpregnant women with functs and daturbances. The most practical diese was I unit to be a ce in two ubcutaneous injection of a ce in an interval I use hour. If the reacts in 1 post is the uvaries appear stightly being the than the also be used I rith largeor. In databil in most and clot in justice to the unit of the latter a post in ce it is obtained with occopy of Junn.

The in restigat is have found therefore that the hyperemia test is sufficient when it is a question of the simple determination of regnance. If there is a suspicious of it turbed pregnance, such a bleed a of uncertain cause the ordinary hormone pregnance test cannot be dispersed with. They at all present developing the folikile-atimulating hormone (A) test in the rat so that in the future the rat term at all be used in cases of daturbed pregnance.

The author evaluates 127 consecutive cases of ectors; pregnance during a period of 15 years at the Units Hospital, Brooklyn New York. There as an incidence of 23 per cent ectopic pregnance is generologic admissions 80 per 1,000 pregnances of an incidence of 1 ectopic pregnance to 1234 per annies occurred.

In 34.5 per cent of the patients the ectopic per nancy occurred as the nat pergamo; 33.0 per cent had had i preceding pergamo; 35.0 per cent had a previous pergamo; as an it, a per cent had had a previous pergamones and 14.8 per cent of the patients had had from 3 to 6 previous programed; R peated abortions increased greath the incidence I ectopic pergamor. A relatively sterile period of 3 years of more preceded the aborrinal pergamory in more than two-thirds of the cases.

The author states that the etk key probable uses greath it may be ovalar di turked iran por tation, or mechanical. The redulas of pelvic in finamators duesse appendents and other persions were factors in 38 per cent of the cave. Three cases occurred I liowing tubal insufficient in table of the table or table of the table of table of

The symptomatology wa variable especially with egar I to the type I pain which wa harp and Labbung r dull and colicky. In 80 per cent of the patients the first compliant was pain. My seed vorginal bleeding was seen in 85 per cent of the patients and consisted. I menes occurring at the normal time but prolonged numers at the a mal time but of misshed menes dels eleveral day weeks and shoes patients in whom there was as illending until the nest of their vimptoms. Twenty for per cent of patients in Inauve and or viming.

The phy scal findings hower also minal tender nes in ou per cent of cases a tender cervir and palpable adnessal masses are financian quiper cent.

patient.

Bit I con t wir it is held in the hages.
The bodog test was him 5 times and was of definit value in the innermity may uses for if if it in the diagrams.

The author to bears that our stage has a wheat but I mited a limit diagness. The microscope unding has decidual reaction is no positive in Leatron includes greatly and conserveds it bears. dees not give proof of its presence. The inding of chorionic vallet gives evidence of an intrautenne prepraine. In 3 cases in which briedman test were positive the curettings showed proliferative endometrium in a case by perphastic endometrium in a case and deedual reaction in a case.

At operation 48 per cent of cases were found to be ruptured tubal pregnancies 35 per cent were tulial abortions and 13 per cent were unruptured tubal pregnancies. In 48 per cent of the cases the condition occurred on the right side and in 45 per cent on the left side. The appendix was removed in 36 cases with 2 resultant deaths. General anesthesia was the anesthetic of choice.

The author believes that a large number of patients can be saved before a state of irreversible shock sets in by prompt and massive transfusions of blood plasma or whole blood

There were 5 deaths with a surgical mortality of 3.1 per cent CATHERINE B HESS M D

Bowles, H. E.: Cervical Pregnancy | Hest J Surg 1945 53 226

Cervical pregnancy is extremely rare. The author presents a review of all of the cases in the literature (54) with the available data in each case. The one argument in the diagnosis of each case is as to whether it is a cervical abortion or a true cervical addition.

The etiological factors are discussed. Retention of a previously detached ovum is favored by a ston one of the outermost portion of the cervix. The pathological evidence of a true cervical implantation is also retrieved.

Cervical pregnancy is a formidable condition accompanied by a high maternal death rate and also a high feat death rate when the fettu develops to the stage of viability. The diagnosis is based upon painless and copious bleeding in the presence of a markedly beliconed-out lower uterine segment

The treatment of this condition depends on the stage at which it is first diagnosed. Emphasis is placed on extreme gentleness as the cervix is often paper thin and may tear extensively with even moderate roughness. Every form of supportive treatment must be available.

In early cases enucleation with a gloved finger or with piacental forceps has been suggested in several cases ligation of the lower branches of the uterne vessels was done to control the profuse bleeding. Vaginal hysterectomy may be done in necessary to control the bleeding if this is not possible abdominal hysterectomy may be resorted to The cervix should be removed but if this seems in advasable a supravagual hysterectomy and firm packing of the cervix may suffice. In late pregnancy addominal ceasarean section seems the logical means of approach, with the liberal use of sulfonamides and pencullin.

The author reports a case of cervical pregnancy at 4% months gestation treated by supravagual hysterectomy with recovery HARRY FIRLDS, M.D.

Andres, G. J. The Blood Pressure in Normal Pregnancy. 1 m. J. Obst. 1945, 50, 300

In the study of 300 cases of normal pregnancy, illusted through three timesters it has been found that the visible blood pressure does not vary significantly during any period of gostation, nor does it deviate from what might be considered normal systolic blood pressure for healthy nonpregnant women

There is evidence that disatohe blood pressure tends to be slightly lower in the first and second trimesters of normal pregnancy than in the normal nongreyed state

On the bases of this study it would appear that any perastent even though slight increase in either systolic or diastolic pressure during pregnancy should be looked upon as potentially significant Enwird LOGHTLI, M.D.

Wilson J. R.: Carcinoma of the Gervix Complicated by Pregnancy Am J. Obst. 1945, 50, 275

Since 1931 6 patients with carcinoma of the cervix, complicated by pregnancy have been treated at the Chicago Lying in Hospital. Of these 2 were referred to the hospital for treatment after the diagnosis had been mad clawwhere Duning this same period a total of 30 710 patients have been delivered thus the incidence of cervical carcinoma is an each 6 for deliveries or 0 015 per cent. All of the lesions were of squamous-cell origin with the exception of 1 which was an adenocarcinoma.

The existence of pregnancy and carcinoma of the cervax together is unusual and presents a difficult problem in therapy but an unusual opportunity to treat early lesions may present itself. The prompt and thorough investigation of bleeding during pregnancy is an important step in diagnosing the condition and may be responsible for saving the life of the patient. In most instances radical surgical procedures have no place in treatment since the result from combined irraduation are equally as good. A high fetal mortality is inevitable since it is usually univate to resort to methods of treatment which at tempt to preserve the fetus but which may decrease the chances for cure of the neoplasm.

Of the 3 patients in this series who were eligible for consideration 3 (67 per cent) survived longer than 5 years after treatment only 1 however is free from evidence of carcinoma

EDWARD L. CORRELL, M. D.

### LABOR AND ITS COMPLICATIONS

Johnson, H W : The Conservative Management of Some Varieties of Placenta Previa Am J Okt. 1045 50 248.

It is suggested that obstetric textbooks be revised as regards maternal prognosis in placenta previa The author has seen no maternal death from placenta previa where nature has been allowed to take its course as regards labor and delivery. He believes that all cases of veginal bleeding in the last trimester There we only a gross infection in the entire series and a complete breakdown. The latter occurred in a median perinentomy wound with third-degree ex tension which became grossly infected subsequent to the employment of local anesthesia

EDWARD L. CORNELL M D.

#### NEWBORK

Schmitz, II E., and Baba G: Aquinone during Labor: Its Effect on the Prothrombin Level of the Newborn Infant 1m J Obst 945 5 20

At tal of 23 unvelected cases of newborn infants was investigated. They were classified according to whether the laboring me ther had received no mediation some f rm of analgeria (usually evelocal sixlium) both analgesia and aquinone or misaquinone. The percentage of cases which remained above the 75 per cent minimum prothrombin level wa as follow a medication 63 per cent analge ic alone 50 per cent both analysis and aquinone %) per cent aquinone alone 90 per cent. Even mor gnif cant was the percentage of cases falling below the 70 per cent level since many clinicians consider values below this level to be an in lication for vita min k theraps (in diseases accompanied by prothr mbinemia) and values below 40 per cent as letialtely in the danger as ne. In case in which no aquinone was used the percentages wer 30 per cent and at per cent for the no medication group and the analgeore only group respectively while in cases in which the aquinone was used the percent ages were 8 and o for the 'aquinone-analgesic group and the againone alone group respectively In this small series of cases no definite conclusion

could be drawn nevertheless certain incidental bservations are set forth. Icterus of varsing de gree was frequently een in spite I the high normal prothrombin level (over 92 per cent) la some cases the icterus was quite marked in spate of the normal clotting time. On the other hand, other cases with a prothtombin level below 40 per cent manifested no leterus | Fan no L. Con | 11, M D

Linn, K. T. and Snyder F. F : The Effect of Res. piratory Stimulants in the Newborn Infant Im J ()4:1 1945 50 46

In newborn rabbit significant stimulation firesparation wa difficult to demonstrate f llosing alpha lobeline coramine or caffeine and following metra gol r evanude the slight stimulation wa transient

and lasted less than a minute \ con iderable bazard involved in the use of these druge was found to be the nam w range between the dwage which affected respiration and that which raped con ubions Two or three times the flective dose usually resulted in con-rul fore in animals which

had received pent harbital premedi ation. Injury resulting in death frequently followed con vul ions which occurred after alpha lobeline cora mine, and caffeine. Survival occurred after metrasol and evanide despite the occurrence of convulsions

The present experiments lend no apport t the use of alpha lobeline coramine cafferne metrand or evanishe in the resuscitation of the newborn infant. EDWIED L. CORVILL M.D.

Morison J E.: Thrombosi of the Aorta in the Newborn; 3 Cases, 1 with Infarction of the Liver J Path Bart Load 1945 57 221

Aortic occlusion is extremely rare and it i niten difficult to say whether it is due to embel in a thrombosis The author presents 3 cases and call attention to the postmortem findings

The first infant died on the eighteenth day of If from uncertain cause. The anatomical duene is was focal artents of the abdominal aorta throm boxis of the sorts rtending into the celuc are thrombous of the left renal and inferior me-enteric arteries infarction of the liver and left kidnes patchy hemorrhagic infarction and ulceration of the st much and descending and pelvic colon, a pirated ammotic fluid a th hi trocytic reaction in the al role diffuse atelecta is small subarachnoid bemorrhages with locali ed thrombooks of the related meningeal wins balanite and left subscute office media.

The second infant died on the fifth day of life with otite media and severe harries. The anatomical lagrown was congenital ancum m of the ductus arteriosus communicating with the aorta ant mortem thrombus in the theracie a rta non-necific pharrogite as I lampates with piceration terminal percumonia acute hilateral otitis media and acut

nonspecific esophag tis The third infant died in the ninth day with

frundice and diarrhea. The anatomical diarrawh in chided thrush and a sociated bacterial injection of the upper respiratory tract a peration bronchopnen monia bilateral renal venou thrombass red and white venous infarcts in both kidneys organia na mbolic thrombus in the nulm nary arteries and terminal thrombosis of the renal arteries and abk minal aorta in the first patient the thrombour was a sociated

with a pecular arterit in the a ther cases it apneared the secondary ther lesions

JANE F DOWNELLY M.D.

Potter E. L.: The Effect on Infant Mortality of Vitamin K Administered during Labor In J Otat 1945 50 215

Evidence has been produced 1 many investgat re which he we no loubt (1) that in the majority of infant the prother main time a produced during the greater part I the first week of his beyond that which is normal f r the ad it (2) that the admini tration of tam n K t the mether prior to delir m or t th infant after both will usually prevent t man just agation (1) that after probing t m ha one ox med alm untrat an 1 tam

halle all cause e turn t corneal There is as pro f he ever that probagat so of prothrombin time is a direct ca se of bemorthage Many infants a th exces evely prolonged pe throm

lin time show no evidence of hemorrhage while others with relatively little prolongation bleed severely. Since almost all inlants show some prolongation of prothombin time during the first week, all who bleed from any cause would be expected to

show some abnormality

The optimistic prophecies which were made early in the study of vitamin K in regard to the prevention of hemorphage and the reduction in mortality rates following routine administration of vitamin K do not seem to have materialized. The present study as well as the investigations of Sanford et al. and Parks and Sweet, inducate that in a carefully studied group of infants anything which can be considered hemorphage disease is extremely rare and that the incidence of the hemorphages which do occur in this age group is not modified by administration of vitamin K to the mother prior to delivery or to the infant after birth.

In the present study which was carried on for a period of almost 4 years 6 560 infants weighing over 1,000 gm, were born during the two years in which vitamin K was given, and 6,650 were born during the next \*2\* months. The total fetal and infant mor tality rate of 29 8 for the last 2 years is higher than that of 25.8 for the last 2 years in spite of the fact that no change of significance occurred in the in undence of primiparity premature delivery mode of delivery or other known factor. The mortality rates for liveborn maints are identical in the two series as are also the numbers of infants who showed evidence of hemorrhage on postmortem examination.

The conclusion was that no decrease in infant of fetal mortality can be expected to result from the toutine administration of vitamin K to all women during labor EDWARD L. COMMENT, M.D.

### MISCRLLANEOUS

Baird, D. The Influence of Social and Economic Factors on Stillbirths and Neonatal Deaths. J. Obst. Gym. B. it. Empire, 1945 52 217

In order to compare stillbirth and neonatal mortality rates in different social classes, her records of 3 groups of Aberdeen cases have been analyzed Group; I was a senies of 1,419 delivered in a nursing home, belonging to the Registrar General's social classes 1 and 2 and mostly under the care of the family doctor Group; 2 was a series of 8,868 booked hospital cases, under the care of specialists belong ing to social classes 3 4 and 5 Group 3 consisted of 501 cases in private specialist practice. In the 3 groups the stillbirth rates were 25, 30.4 and 10.0 per cent respectively and the neonatal mortality rates 150 a 45 and 8 Ir per cent

In Groups 1 and 2 the stillburth rates in full time and premature Infants were the same and in each group the stillbirth rate in premature Infants was 10 times that in full time infants. The excess mortality of Group 2 over Group 1 was due to the incidence of prematurity in Group 2 being almost double that in Group 1.

The patients in Groups 1 and 3 were in the same social class and the differences in the stillbirth and neonatal mortality rates were probably due to different standards of obstetric care. In Group 1 the stillbirth rate fell from 476 per cent in the years 1933 to 37 to 14 pper cent in the years 1934 to 17 to 18 pper cent in the years 1934 of 18 to 18 pper cent in the years 1944. This fall was due mainly to improved obstetrics.

In Group a the stillbirth rate was 3 times that in Group 3 although the standard of obstetric was the same. There was very little scope for reduction in the stillbirth rate in Group 2 except by measures designed to improve the health of the mother.

The problem of the high neonatal mortality in Group 2 is largely one of the prevention of prema turity. Security per cent of the deaths in premature infants occurred within 48 hours of birth, most of the infants being too feeble to maintain a separate existence.

The stillbirth rate is relatively high with first pregnances least in the second and thereafter rises with each pregnancy. The rate rises with age in each parity. In Group 2 primiparas the stillbirth rate in the age group from 25 to 34 was nearly 5 times that in the same age group of Group 1 primiparas.

The reproductive efficiency in Group 2 as meas used by the stillbirth rate fell off steadily after the age of 20 whereas in Groups 1 and 3 the fall in ef

ficiency was delayed till the age of 30

In Group 2 63 per cent of the primiparas were under 15 years of age and in Groups 1 and 3 19 per cent. The stillbirth rate in the latter groups would be very high if the reproductive efficiency in these groups fell off as quickly with age as it does in Group 2

Over 30 per cent of the stillbirths in full time in fants in Group 2 are due to intrauterine death of the fetus from unexplained causes. The cause of the on set of premature labor is unexplained in about 50 per cent of the cases in this group. The most probable explanation in both cases is poor health and nutrition of the mother.

From a national point of view the stillibirth and neonatal mortality rates will be most substantially improved by improvement in the standard of health and nutrition of the mothers in Social Classes 3 4 and 5 corresponding to Group 2 in this series as they constitute the vast majority

DANIEL G MORTON M D

Falk, II C. and Blinick, G. The Pathogenesis of Postabortal Peritonitis. 4m J. Obst., 1945 50 168

In this series of 61 cases of postabortal peritonitis all patients presented an endometrids of varying severity. The infection spread from the endome trium to the peritoneum as a result of direct extension through (1) the tubes, (2) the parametrium (3) the myometrium and (4) by a combination of these routes.

Direct extension through the tubes seemed to be the pathway of infection in 40, or 66 per cent, of the cases studied. Extension of the infection from a parametritis to the peritoneum occurred in 6 or 10 per cent of the patients. In a patient the peritonitis was caused by rupture of a broad ligament abscess into the pertoneed cavity.

The infection extended through the myometrium

in 4 or 7 per cent of the cases

In 6 patients endometritis salpingitis parameteritis and personitis were present. The pathway of infection was not clear.

In a patients endometries abscure of the myonetrum, salpingitis and pentonitis occurred. It is probable that in this group the tubes were the chief patibuars of extension as the myonetrum contained discrete abscures with no contiguous inflammation of the enveloping pentoneoum. The cases are not in cluded in the first group because of the questionable citology of the pentonitis

Owition althous was found 17 times an incidence of 88 per erent. Thrombophilability of the uterias or of 88 per erent. Thrombophilability of the uterias or overant veries or of both occurred in 30 or 35 per cent of all the patients observed. It was more common in the patients with parametritis or myonic truth alone or in combination, then in those with salpingitus alone. Of 40 patients with salpingitus and peritounits to showed philability whereas in the 30 cases with parametritis invomentitis and peritoun it is observed venous inflarimentum. In 5 of the 50 patients there was localized thrombophilability that the so patients there was localized thrombophilability. No other sites of embolization were found despite careful study.

In this series the most common pathway f infection to the peritoneum was by direct extension through the fules — Edward L. Crossill, M.D. Tietra, C. and Hagamen J B: The Acceptability and Effectiveness of the Condom As a Contra ceptive Method Ass J M Sc. 1945 to 180.

The authors present the condom as an acceptable and effective means of contraception from a pottle health point of view. A study was conducted under the suspects of the National Committee of Material Health, in Watanga County North Carolina a rural area with I title education as far as brith-control methods were concerned. Coodoms of high quality were used. Mostly white people of the farmer class were used in the author's study.

were taken in the arthors a study. The need for birth control was discussed with all wives concerned in the study and the use of the work control on the study and the use of the were included in this study and their experience were followed from September 1030 to late in 1031. Contraceptive techniques (Including withdrawal) and been used by 45% of all couples and were being used at the time of the interview by 38 per cent. Of the 140 couples practicing contraception, 55 per cent were using continues. 7 per cent writhdrawal, 3 per cent doubtes with jellies suppositories safe period.

and disphragm eich accounting for a per cent or less supplies were accepted and used by 50 per cent of the couple. Of these 73 per cent were stall usage them after a period of 50 months. The degree of totection offered by means of contraception appearance that reported for the disphragm and felly and exceeded that aff rided by foam powder and briefly after.

jetty asone. The prescription of condoma for the prevention of dangerous or undestrable pregnancies requires little of the physician's time and is well mitted to inclusion in multic benth programs. Barry Frinci, M.D.

# GENITOURINARY SURGERY

# ADRENAL, KIDNEY AND URETER

Dahl Iversen E: The Technique of Suprarenalec tomy and the Use of This Operation for the Genitoadrenal Syndrome in Childhood (Tech nique de la surrénalectomie et surrénalectomie pour le syndrome genitoadrénal pendant i enfance)

A sketch is given showing the blood supply of the apprarenal glands an accurate knowledge of which is necessary for operation on this organ. The supra renal gland is relatively very much larger in the child up to 3 years of age than in the adult the proportion of kidney to suprarenal tussue being 3 to 1 in the child and 30 to 1 in the adult

The technique of suprarenalectom) is described in detail. The organ may be approached from in front or behind The abdominal incusion is preferable in large tumors but in operations for a hormonal syn drome without tumor the author prefers the lumbar incision. The incision is made along the lower border of the twelfth rib and this rib is resected American authors seem to prefer a vertical incision. The lum bar incesion and resection of the twelfth rib may be performed on both sides but the author thinks it preferable to operate only on one side at a time. He operated on 2 cases in this was with good results while in a third case in which operation on both sides was performed at the same time the patient ded of profuse pulmonary atelectasis and pulmonary edema He thinks this result may have been due to the simultaneous removal of both twelfth ribe which made ventilation of the lungs difficult

The patient should be examined carefully before operation to determine whether there is tumor or hyperplasia For a days before operation he should be given a diet poor in potassium and rich in salt An abundance of carbohydrate and extract of suprarenal cortex should be given before operation. Glucose solution and suprarenal extract should be given after operation also the length of this post Operative treatment depending on the electrolytes blood sugar blood urea and blood pressure A phy sican should be in constant attendance on the child for 4 hours after the operation, and a nurse for 4 days In bilateral operations the left side should be operated on first as the chances of finding a tumor on that side are greater

Four cases in which the author operated are dis cused. In a there was a genitoadrenal syndrome and in the 2 others a Cushing syndrome sithough in 1 of these there was some doubt as to the differ entiation between the Cushing syndrome and the senitoadrenal syndrome There was recovery except in the case mentioned. In this case there was a small basophil adenoma in the anterior part of the gland In the other cases there was only hyperplasis In cases of bilateral hyperplasia bilateral resection

should be performed. If the hyperplasia is unilateral the operation should be done only on the affected side if indeed operation is performed at all in such

So far the treatment has not shown any great effect in the cases mentioned except an improvement in the mental condition of the patients

AUDREY G MORGAN M.D. Smith C. C. W ith C. C. W On Urinary Lithiasis in Child hood. A Clinical Study of 71 Cases of Urinary Calcull in Children let chir scand 1944 90

This article discusses 71 cases of urmary calculi in children collected from various hospitals in Copen hagen from 1929 to 1943 special emphasis being placed on prognosus and treatment patients 51 were male and 20 female almost three times as many males as females this corresponds Fretty closely to the figures of other authors for un nary calcult in children and also to those in adults Therefore urinary calculosis in children is not near is so rare especially in Denmark, as it has generally been assumed to be and as considerable damage may be done to the urman tract by these stones it is advisable to remove them surgically as promptly as possible no matter what the age of the patient

The age of the children at the time of diagnosis was quite uniformly distributed from less than I year to 14) curs of age However if a study is made of the time at which symptoms began it will be seen that stone formation began at a much earlier age than chinical experience would indicate. It occurs to a great extent during infancy and this is the period at which a study of the factors causing it should be made Eleven of these children had developed cal cult before they were I year old. Two-thirds of the children (41) apparently had the stones before they were 5 ) cars of age and 25 before they were 3

Most of these cases showed stones of the kidney and ureter although the majority of the reports pre viously published showed that most of the stones

In 26 of the cases the stones were passed apon tancously and in 12 of these there was no recurrence In the others the lithiasis persisted Among 33 cases subjected to chemical analysis 31 yielded so-called primary aseptic stones composed of calcium oxalate urate, and phosphate while only 2 cases yielded in fected stones Fyrdently infection is not of great importance in the causation of urmary stones in childhood Anomalies of the urinary tract, how ever are of great importance Such anomalies were found in 58 of these cases Roentgenograms of sev eral cases are given in the original article

Almost a third of these children had no demon strable changes in the urine \ormal urine there fore should not necessarily lead to a negative diag nosis. When pain occurs in the urlnary tract, careful examination should be made by means of urography pyelography evistoscopy and evit graphy.

In this material 65 operations were perf med in 55 patients. Primary nephrectomy was performed in 7 cases simple lithotomy in 36 and several operations were performed in 9 cases. Even very young children bear these operations well. There was only 1 death following operations well. There was only 1 death following operations in this series and this was in an infected case. If there is infection in the urnary tract, treatment should be followed up until the urnary tract, treatment should be concervative in acroup shateral cases.

Among 43 surgical cases re-examined later 34 showed no recurrence. There was recurrence in on 21 per cent, the percentage of recurrence in infect ed cases being 20 and in noninfected cases 11

AUDRLY G. MURGAN M.D.

Kohler B. The Prognosis after Nephroctomy; A Clinical Study of Early and Late Results. Ad the st 4 044 0 7

A knowledge of the results of nephrectomy especially the late ones is very important in surgical urology but heterofore a circula study of these results has not been made. This article presents a study of the follow-up examination of the patients upon whom nephrectomy was performed at the Maria Hespital in Stockholm from 1905 to 1034. They were 197 in number. Detailed case histories of some types of cases and tables showing the results of treatment are given, as well as an extensive bibli

ography on the subject.

The number of nephrectomics performed in Sweden is steadily increasing, because of improved diagnosis and greater confidence in surgical treat ment. In 1938 545 nephrectomics were performed,

or 1 to every 13,000 of the population.

A detailed discussion is given of what is known of
the functional condution of the remaining kolney
after operation. In this series of cases kidner tuber
culosis and kidney tumor are not considered. The
cases operated on were mostly cases of hydronephrors infection, and calculus

There were an patients with hydronephrosis of these 4 died soon after operation and r could not be traced. Of the remaining 44, 17 later showed again of disease of the unnary tract. Nephrectomy was performed for renal ectopat in 1 case and for rupture of the kidney in another. No secondary dephasion of the kidney in another No secondary dephasions of the control of the control of the control of the condition. Nephrectomy was performed in 21 cases for infection not connected with concertions. Two of these patients died, and of the remaining 10 11 later had symptoms of disease of the unjusty tract. Nephrectomy was performed on 3 patients with cystic kidney and 3 with a renal cyst. One patient operated on for cystic kidney survived for 21 years. Nephrectomy was performed for renal calculus in Nephrectomy was performed for renal calculus.

103 cases, among these there were 7 postoperative darks. Two patient could not be traced. Title eight of the remaining 04 aboved signs, if these so the unmart stace in later examination. Nephret I my was performed on 6 patients with wealth duesase. This indication for nephretcomy should be rare. Ever patients with disease of the uniteral were nephretcomized.

The operative mortality was 13, or 6 7 per cent. The mortality was considerably higher for males than for females 10.6 per cent and 3 6 per cent, respectively. Some form of prological disease was demonstrable in 96 of the 184 patients who sur vived the operation a table is given showing details of the nature of these diseases. Urnnary tract infec trons occurred in 37 per cent of the nephrecionized females and as per cent of the males. Of 105 patients now living who were examined by means of non protein-nitrogen determinations 4 had imminent or manifest uremia. Of the 56 patients tested for cre atinine clearance 6 (10 per cent) had reduced renal function. For practical purposes it is sufficient to test the kidney function of nephrectomized patients by nonprotein-nitrogen estimations and concen tration tests. The risk of uremia was still remote in the majority of the patients with reduced kidney function. Blood pressure determinations on 111

patients showed hypertension in 61 or 53 per cent. Life expectancy in nephrectonized patients depends on whether pathological symptoms penist in the unnary tract. Deaths from unriary-tract decess were found to be common in the patients who survived operation. It should be possible to decrease this risk by adequate treatment after nephrectomy. Some patients should be kept under continuous supervision after the operation. Even if the patient is dislicitly well some years after the operation there is still a possibility of complications such as the reformation of stones after nephrectomy for calculus.

BLADDER, URETHRA, AND PENIS

Tauber R.: Stricture of the Female Urethra with Lymphopathia Venera A x. S 72 945 1

A colored woman, age forty-one, was admitted to the hospital complaining of great difficulty in void ing her nrine. She stated that ten years ago on a very cold day she had to wait for a trolley car a very long time and arriving at the factory she felt cold "up to the navel." She was unable to pass urine, and on her way home the started diribling. Her family physician could not pass a cathetre and ordered medcine which improved the condition temporarily. Since this time the patient had been under medical

On physical examination the urethra was found to be extremely narrowed and allowed only the passage of a filliorm ureteral catheter by which the greatly overdistended bladder was evacuated. The Wasser man reaction was negative. The only positive finding in the case was the positive reaction to the Frei test, which proved to the author that the patient was suffering from lymphonathia veneres.

Lymphopathia venerea is a disease of the lymph channels and of the nodes which is due to a litrable

virus and gives a positive reaction to the Frei test.

The lymphopathic infection of the urethral mucosa
may occur in different forms erosion superficial

ulcer and scropurulent inflammation

It should be emphasized that there is a variation in the form of the disease in men and women as a result of differences in the distribution of the lym phatic drainage.

In the male most of the lymph channels of the senitable drain into the inguinal nodes and some drain into the deeper iliac nodes. In the female on the contrary only the lymph from the clitons and external vulva drains into the inguinal nodes while the supply from the vaginal mucosa (and especially from the posterior vaginal wall) drains into the lymph nodes around the rectum where there are three lymph plexuses extending together up in the rectum to a height of from 4 to 6 cm. Consequently, rectal strictures are much more common in females than in males who suffer from this disease.

The lymphatics of the whole urethra in the female pass to the hypogastric nodes. This is the reason that we do not find enlarged linguinal nodes in case of involvement of the urethra alone. A stricture of the urethra discussed by lymphaphathic disease can be explained only by a primary involvement of the urethral muosas and the lymphatics in the immediate neighborhood. In the urethra a primary involvement of the muosas takes place and the infection spreads through the lympha channels from the urethral mucous membrane and forms scars with stricture formation of the urethra.

The diagnosis of lymphopathia venerea has been greatly simplified by the discovery of Frei, an nounced late in 1923. This specific cutaneous sensi tivity lasts for many years perhaps during the life of the patient in other words the patient develops an

allergic state.

The fact that a patient is suffering from lymphopathia veneres does not prove that the lymphopathia veneres stands in causal relationship to be urethral stricture. A case of proved lymphopathia venerea may induce urethral stricture following trauma during a delivery and in such a case one the combination of stricture of the urethra and a positive Freiters.

If the stricture is not too tight nor spread over too large an area it may be treated by rapid dilatation putting the patient under gas ancethesis and peasing thegat dilators until the canal is enlarged from 2 to 3 mm in diameter or up to the size of the average glass catheter from 6 to 7 mm.

The patients should be warned that recurrences are common and that for this reason they should return several times a year for dilatation

JOHN A. LOUR M D

### GENITAL ORGANS

Munger A D The Treatment of Carcinoma of the Prostate by Irradiation Radiology 1945

45 3

In his introduction the author emphasizes the high incidence of prostatic carcinoma (from 14 to 20 per cent of all prostatic tumors) and its bad prognous due to the absence of symptoms which prevents early diagnosis and also due to the early formation of me tastases. He gives a clinical classification of this condition (based upon a previous study) which al lows a more accurate prognosis. He acknowledges the significance of a rise of the acid phosphatase serum level the importance of sterilization and the role of hormone treatments but he does not share Huggins opinion that orchectomy is the method of choice He believes that x ray sterilization combined with regional irradiation is more effective. In order to clarify this point the following series of 27 cases of histologically proved carcinoma of the prostate was treated during a two-year period ending May 1043 (The results refer to the time of presentation of this paper September 1044) The cases were divided into 3 groups. The first was treated by resection (mainly for blopsy purposes) and by orchectomy Of the 7 cases so treated only 2 were successfully stabilized Two of the patients died of metastases. and a had metastases when first seen

The cases in group 2 were treated by resection and regional and testicular irradiation. Of the 12 cases so treated 10 were successfully stabilized. Two patients died of metastases but 1 of these had discontinued the treatments. Seven had metastases

when first seen

The cases in group 3 were treated by resection regional irradiation testicular irradiation and estrogen therapy (ethnyl-estradiol) Of 8 cases to treated 7 were successfully stabilized. The subjective wellbeing of the patients was superior to that of other groups. One patient died of cerebral hemorrhage

The acid phosphatase serum level was studied in

all of the patients.

The author arrives at the following conclusions
Treatment consisting of resection testicular fira
diation local irradiation and estrogen administra

tion gives the best results

2 An elevation of the acid phosphatase level is a reliable indicator of activity but its absence does not prove the contrary

3 The experience of other authors that x my castration was incomplete is explained by their giving an

insufficient dose to the testes

The author gives daily doses of 300 mentgens, i.e. a total of 1 800 mentgens in six days to the testicles. He uses 200 kv (peak) 0 5 mm. of copper plus 1 mm of aluminum filter H V.L. o mm. of copper plus 1 mm of sluminum filter H V.L. o mm. of copper This is followed by a more or less conventional deep x ray therapy to the pelvis through 4 portals up to a depth dose of 5 500 mentgens in the midpelvis in fraction ated doses. This constitutes the aforementioned regional irradiation

determination resistance to spermaticides viscosity and rate of inquestrion are made as a rule although none of these factors has as yet been proved of deci sive import in matters of fertility. The material us

then prepared for microscopic study

A thin film is made from well-mixed seminal finite (thorough mixing is essential as immodific sperm whis rapidity on standing). Dense specimens may be diluted with an engul quantity of flanger or other isotoole diluent. The sperm is fixed by inverting it over a drop of a per cent omic acid in a watch giars for five minutes. The seminal fluid is then coaquisted by flooding the side with Schaudinn a fluid for one minute. After fixing the side is muster in accordance where the side is muster in accordance to the side of the side is muster in accounterstained in 45 per cent rose bengal (either the watery or the 70 per cent sicoholic solution for one minute), dehardrated and mounted.

The slides are examined under 1/12th objective, roo being counted in routine practice. The sperm when counted is classified as (a) normal or abnormal as to the head with subclassifications into (b) amorphic, (c) mounter (d) double, (f) pin, and (g) round pear or tapering or as to the middlepiece and tail, with subclassification into (h) collar (i) bent, (f) thick neck, (k) double tail (i) feided tail and (m) rung forms. These letters correspond to those on Figure 1. The authors studies indicated that in the fertile make the abnormal forms should not comprire more than 35 per cent of the total

spenn count.

The total sperm count per cubic centimeter of seminal fluid the motility and the "ability are determined in seminal fluid warmed in an uncubator for one boar to 37 °C. The fluid is diluted appropriately and counted on a warmed Thoma side. One drop is counted for the number of immodile and frebly motile sperm, and another drop, in which the aperu is immobilised by omnicated fumes is given a total count, and the difference between these two counts designates the number of fully motile sperm. The authors condider that the total figure, the so-called

density should be at least 50 million sperm per cubic centimeter of seminal fluid in a fertile male and the number of fully motile sperm should range from 50 to 10 per cent according to the time elapsed (from one half to seven hours) since the specimen was procured. A similar estimation is made after three hours and after five hours of incubation (the to-called index of viability') Vlability is judged by the ratio of the percentage of motility after three and after five hours of incubation in diluting fluid to that after one hour the sum of these two ratios being desig nated the "viability ratio." If no fall in activity occurs during the five hours the 'ability ratio would be ? The authors and that in the fertile male the viability ratio one half hour after the specimen of semen field is procured should be 1 5 in one-half to three hours it may drop to 1 as, n the

hours, to 1.0 and in five to seven hours to In 236 chinical cases seen by the auti

sterility clinic at Ereter in South England

examination was carried out as described and in an attempt to entablish a means of assessing the fresh it with the cases were designated an A for each of the four factors just document when they were above the minimum injures given for probable leafility and a B when less than that figure indicated a probable subferfility. In the 350 cases there were as with a rating of A AA 3 65 with AAAB 51 with AABB and 50 with BBBs and

Applying these criteria and taking into consideration the wife's degree of tertility or melectrility has each case the authors are of the opinion transcent subfertility does not become of prinary into realsubfertility does not become of prinary into realcists. The control of the sense analysis are found to fall below these minimal values in all four factors (about roper cent of all cases). In this 70 per cent, (about roper cent of all cases) in this 70 per cent, treatment with textostrone tablets, testorterone un plants, ambinon A androgens or thyroid did not seem to get any results. The analysis is of relative importance when the values fall below the minimum in at least two of the factors (about another 40 per cent).

For the immense amount of detail concerning the minor factors affecting these general considerations and the authors recommendations for further work in this field the resider as referred to the original article. Berryus M.D. Jose W. Berryus M.D.

McMartin, W. J.: Urological Aspects of Filerhole.
J. Low Balt., 1945. 54. 62.

Filariasis has infected thousands in our armed forces stationed in the Pacific area

The disease in these men is characterized by episodes of lymphangitts and lymphadentis with the majority of the patients aboving genital (scrotal) involvement.

Cyllan urologists will be confronted with the problems of differential diagnosis of intraserosis pathological changes caused by fianasas from intraserosis pathological changes usually encountered in the United States

There are many members of our armed forces a be have hlaris is and fear the onset of elephantiarit despite attempts of medical officers to depet their fear. We can do a great deal to case these patients' minds by education pertaining to the characteristics of the disease.

There is no specific drug in the treatment I filari asis. Removal of the patient to a temperate chimal and away from the chance of more infection is most important

Rest elevation of the affected parts and cold applications is the treatment of choice in episodes of exacerbations of the disease

Research on the treatment of filtraces is contantly being carried out by very competent medical personny Arms and Navy Excellent result I the be reported in the literature axon Much ed to the knowledge of the path

ology of is when and if complete port mortems can be done on patients who

have filarness or who give a history of having had filarness at some time during their life Filarness will not become a public health problem

in the United States

1945 92 IIS

Permanent disability as a result of filanal infestation among our armed forces will be a ranty
found A Lory M D

Hjort E. and Sietvold, K. Postoperative Bacterial Findings in the Lower Urinary Tract after Suprapuble Prostatectomy Ada car stord

The two chief dangers in suprepublic prostated tomy are infection and hemorrhage. To combat in fection effectively it is necessary to have a thorough knowledge of the types of bacteria most commonly found in the urine. Therefore the authors made daily bacteriological examinations of the urine for two weeks after prostatectomy in 34 cases. They found that the predominant bacteria were the escherichia coli and the streptococcus fecalis the former being found in 32 cases and the latter in 28. Mer being demonstrated for the first time these bacteria appeared in every later test. In a cases the escherichia paracoli and the bacillus alcaligenes fecalis were found instead of the escherichia coll The bacillus proteus was found in 5 cases the staphy lococcus aureus was found in 3 cases and the preudomonas in i case

As the betteris found in the urmary tract were practically always intestinal bacters it seems probable that the source of infection has in the intestine takes place very quickly even when the most careful assessin is practiced. In 24 cases the urine contained intestinal bacters on the day after the examination, and all of the specimens of urine were positive for intestinal bacters on the fifth day. The bacters are probable carried from the intestina to the bed of the prostate by the blood and lymph. Some experiments made by the authors show that it is improbable that the urethin or the akm are the source of infection.

In 35 cases cultures were made from the enucleated prostate gland in 12 cases they were positive and in

23 cases negative. They were not positive any more frequently in the cases with prostatitis than in those in which there was only an adenoma. In some cases the prostate gland contained bacteria when there were none in the urine. Examinations of punctate from the exudate in cases of epudoymites showed that this disease is not necessarily caused by the bacteria in the urine but may come from some other source possibly the urethra.

Two cases of psychosis following prostatectoms are described. They were probably caused by bacterial toxins

AUDREY G MORGAN M D

Prince C. L. and Richardson E. J Jr AP-43 a New Antispannodic for Use in Urology J Urol Balt. 1945 54 75

A new synthetic antispasmodic, AP 43 was use in a series of 61 cases in which spasm of the smooth muscle of the urinary tract was thought to be the major cause of pain

This drug was found to be extremely effective in relieving pain resulting from oreter catheterization

and retrograde pyelography

AP 41 will normate the r

AP 4.5 will promote the passage of a substantial number of unternal calculi, when their size is not such as to preclude their spontaneous passage. With this type of calculus AP 4.5 will relieve pain in the great majority of cases. Apparently, unless pain is present with the calculus, the drug is not effective in assisting the passage of the atom.

In 13 of 10 cases of severe bladder spasms. \\ \frac{1}{43} \end{asses of severe bladder spasms. \} \end{asses of severe bladde

It is suggested that AP 43 is of value when used under the following circumstances (1) prior to retrograde pyclography to prevent postpyclogram pain (2) prior to cystoscopp, as an aid to ureter catheter matter (3) prior to cystoscope manipulation of ureteral calcult to give greater relaxation of the ureter.

Undesired side effects are uncommon and usually mild in nature when they occur. There was no evidence of cumulative toxic effects in this series of cases. The drug may be given effectively either by mouth or inframascularly. David Lory M. Dor M.

# SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Weeden W M and Stein H D: Experiences with Injuries and Diseases of Bone in World War H i s Surg 945 3

In an evacuation hospital which, by force of cir cumstances, acted as a general hospital the authors treated numerous cases of injury and disease of prac-

tically every bone in the body

Most fractures of the clavicle responded to simple treatment—a cruciate splint, holding the shoulders back and leaving the arms free. In general this has proved satisfactory. In cases of osteomyelith, the most rapid closure was obtained by removing the whole unoview hortion.

Fractures of the scapula require little treatment beyond strapping and rest of the part. Ostcomveliits may be rather extensive and in one case required the removal of the entire body of the bone.

Fractures of the ribs, without pleural or pul monary damage are also easily cared for Infection may be extensive, and may spread rapidly

Fractures of the vertebrae were treated by pla ter jackets and rest for a period of four months, all though so prolonged a rest may be unnecessary. Transverse-process fractures respond quickly to several weeks of rest in a light plaster jacket, or to merely adhesive strapping.

The hanging cast' for fractures of the shaft of the humerus has given excellent results. Immobilization for from an to eight weeks proved sufficient, and early treatment with heat and manage helped to

restore full motion.

Fractures of the olecranon process or the epican dyles are best treated by open reduction and accurate replacement of the fractured fragment. Early active motion is necessary. When complete anky loals is unavoidable, an effort should be made to accomplash it with the arm in about 80 flexion.

Fractures of the shaft of the femur have been treated frequently with a three way splint—a 6-inch wide planter splint applied posteriority, extending from the up of the scapula to the end of the toes, a second aimliar splint extending laterally from the lower ribs to the tip of the external malleolus, and a third splint applied anteriority running obliquely from the anterior superior spline to the lanes surface of the knee. This type of splint is effective, comfortable easily adjustable, less likely to cause pressure sores, and can be removed in part freedy muscle massage.

Scoutz Kay M.D.

Weens, H. S., and Brown, C. E.: Atrophy of the Terminal Phalanges in Clubbing and Hyper trophic Osteoarthropathy Redisleys 945 45 27

Hypertrophic osteoarthropathy is a condition well known to dinicians and radiologists alike Ita clulcal manifestations, however differ from its reentgen findings by their location. The physical examination reveals that the soft tissue swelling is most marked around the terminal phalanger of the fingers and toes (clubbing) whereas the roentgenological indengs which consist mainly of percentage how bone apposition, predominantly involve the datal shafts of the ulnar radii tiblae and fibulae, occasionally extend to the proximal phalanges but almost never affect the terminal phalanges.

The authors refer to the small number of previously reported cases which showed atrophic bone changes in the terminal phalanges and add a of their own. The inst case that of a fifty nine year-old cobined female displayed marked destruction of all the terminal phalanges thuming of the shafts of the anddle phalanges of the toes and hypertrophic periostitis of the long bones. There were no signs of pulmonary or heart descase. The second patient, a colored male thirty years of sign, was afflicted with congenital heart disease. The nody x ray finding in his case was atrophy of the unguinal processes of the terminal phalanges of his toes.

The authors conclude that this bone atrophy was preceded by the more commonly known hyper trophic changes mainly because histological and roentgenological examinations by others have shown that lacunar absorption and osteopo osis of the newly formed subperiostes) bone occur in advanced cases (The ld explanation that pressure from neighboring soft tissue swelling or from dilated pulsating small blood vessels causes the erosion of the terminal phalanges has not been confirmed by pathologists according to the authors ) In the differential diagnosis of atrophic or destructive changes of the terminal phalanges, Raynaud's disease scieroderma psoriasus syringomyelia, tabes dorsalis and leprosy are discussed GIREART S. SCHWARL, M.D.

## Kautz, F.G. Capsular Osteoma of the Knee Joint. Radiology 945 45 62

The author presents 4 cases of benign externs of the knee foint and concludes that externs of the knee joint as well as of other foints such as the elbow hip shoulder and ankle is rare.

Roentgenograms reveal characteristic changes, differing from those in other arthrogenic tumors, such as chondromatosis or jourt mice. The absence of any bone connection between the tumor and the adjoining bone structures can readily be demonstrated. The blood versels and surrounding steletial perits are never invaded. A well-delineated studow of bony density with cancellous and sometimes spongy pattern is usually found with small irrepulse areas of increased radiolicency. There is a mort or less continuous dense outer shell and the shape of the shadow may be that of an hourglass an Indian club an egg or of the pattell.

The history usually ranges ever many years and often dates back to traumatism during the age of bone growth with repeated mechanical damage to the knee in the interval. The size of the tumor a shown on rootigenograms and at operation is barely in proportion to the low grade functional impair ment and clinical complaints. Symptoms and signs seem to become more marked as the patient enters middle age.

The etiology is still obscure The authors obser vations and those of others seem to support the oninion of Kienbock that infection plays no part and that a single injury can hardly be the cause of the condition. Since repeated traumatism of occupational or athletic character can be traced over many years in the majority of the patients it can be assumed that mechanical influences induce a proliferation of a normally dormant biologically poly valent and potentially bone forming synovial tissue Whether the primary damage of the synovial cells consists in a constitutional embryonal aberration or a traumatic detachment with subsequent implan tation before the termination of bone growth cannot be decided. Insidious proliferation of dormant embryonal-cell rests with metaplastic changes is well known in tumor pathology A similar origin of the joint categona from synovial implantations under the impact of repeated mechanical damage over a long period of time conforms well with the present con ception of tumor formation.

DODGLAS R. MORTON M D

Hartz, P. H.: Cancerous Synovial Tumors. 1rch Path. Chic. 1945, 40, 88

Three cases of a cancerous synoval tumor are presented. In a case the tumor originated in the knee joint and in a case in the foot probably from a tendon sheath. In a case the tumor cells were unilaterally differentiated and resembled histocytes whereas in the other 2 cases the tumor showed a complex organoid structure with cells resembling epithelium. In all 3 cases the patient was treated by amputation. In 2 cases the cancerous nature of the disease was recognized only by microscopic examina tion.

ROBERT I MOYCOMERY M.D.

McLaughlin, H L. Lesions of the Musculoten dinous Cuff J Am M 1sr 1945 128 563

Sixty proved ruptures of the short rotator cull of the shoulder form the basis of this report Eleven of the patients were under forty years of age and 3 were under thirty years of age. Nineteen of the patients were women.

Most of these ruptures occurred in well used shoulders in individuals past middle age. It is reasonably certain that sufficient degeneration at times so weakens the tendon for strains that it may rupture without significant cause

Early repair is not warranted in the average case because early repair has been no easier to accomplish than late repair. The results of early and late repair have been identical. The symptoms in a large per centage of cases showing a clearcut clinical picture of rupture subside spontaneously under conservative therany to such an extent that repair never need be Since rupture almost always takes place through a degenerating portion of the tendon effi cient union of the repair can be expected only after the degenerated edges of the tear are excised Whether operation is done early or late excision of the periphery is equally necessary. It has been demonstrated that the tendons making up the upper segment in any given position of humeral rotation are an essential factor in both initiation and main tenance of abduction and that the function of the individual intrinsic muscles is interchangeable in this respect. Dislocation at the shoulder accompanied by a fracture of the greater tuberosity almost always is accompanied by a torn cuff

More than roo calcific deposits of the shoulder have been explored Only was accompanied by a torn tendon. The only definite indication for exploration consists of pain or desability sufficient in duration or seventy to make the procedure worth while from the patient a point of view. A plan was followed for the diagnosis and evaluation of the torn shoulder cut if Suxty four shoulders with a pre-operative diagnosis of rupture were explored. The diagnosis was incorrect in a cases.

RICHURD J BENNETT JR., M D

Björkroth T: Subcutaneous Rupture of the Distal Tendon of the Musculus Biceps Brachil 2 Cases (Die subkutane Ruptur der datalen Schne des Musculus biceps brachli 2 Faelle) icto cher sc nd 1943 89 30

Two cases of rupture of the distal tendon of the biceps brachi muscle are reported. Both occurred in white males with powerful muscular development The one a young man of 38 years slipped and fell on the street and in attempting to "break his fall with his right arm experienced a tearing sensation followed by pain and loss of muscular power in this limb Later medical examination brought to light the abnormally elevated location of the bulge of the bicens absence of the taut distal tendon and loss of power in flexion at the cloow and in supmation of the forearm. The second man was 58 years old he had attempted to lift a heavy cask and exhibited practi cally the same symptoms and findings. In both patients operation was performed 4 and 5 days respectively after the infur-

In incision was made in the bend of the cibow blunt dis-ection was carried out down letteren the muscles the vessels and nerves being held aside by blunt hooks. The tuberosity of the radius was brought forward and rendered access like live extreme supination of the forearm a hole was drilled through it near its lasse an 1a linen thread which had previously been attached to the ruptured tendon end was passed through this drill bole which pulled the tendon stump down to the tuberosity where it was secured. For the next four weeks the arm was held at an angle of 90 degrees and in maximal supination.

in a plaster cast. The result was perfect return of muscular function and power

At microscopic examination a bit of each tends neveated noticeable degenerative and regressive changes with a suggestion of inflammatory response in the older patient. However the author leaves open the question as to whether the changes were due to the injury itself or to a preceding condition, such as bretcherodal burith.

JOHN W BREEKHAR M.D

Howorth, M B : Echinococcosts of Bons. J B ne Surg 945 27 401

The author presents a case report of echinococcosis of bone with several accompanying roentgenograms (Fig. and 2)

There are numerous cases of echinococcus disease of bone in the world literature (an estimated 1,000) but the disease is rare in the United States.

Bone involvement occurs in about z per cent of cases of the disease. Pain is the most common symptom of bone involvement, and is due to leakage or to pathological fracture.

Asymtion or puncture of the cynt yields the char acteristic fluid and often scolices or fragments of laminated membrane but it should not be practiced because of the dangers of sensitizing the patient, of amphylaris libe is already sensitive, or of producing secondary cynts by implantation of the scolices which except into the tissues. The fluid is clear and limpid or milky unless stained by other fluids. The scolices were white granules just visible to the eve-

Daughter cysts are milky white opalescent semitransparent and hollow Scollees hooklets or fragments of laminated membrane may be found in the putum urine r feece after rupture of a cyst. Other laboratory diagno-the tests are decursed.

The differential diagnous depends largely upon the possibility of echinococus disease upon labors tory tests and upon the recent groups and accept the state of the control of the control

Treatment has been unvarianteery to date. Mar supialization or sterilization of the cyst may sometimes be successful. Rosentgen unradiation has falled. Removal of the entire discussed area has removed the discusse, but it is mutilating. Insertion of bone chips will not be successful unless the discusse has been eradicated. Amputation is the choice of treatment in selected cases. Ros set P Morrocogar M.D.

Jones, G. B.: The Pathology of the Ruptured Plantaria Muscle B ii M. J. 945 1 876.

The case f a soldier thirty-one years of age who was thrown from a motorcycle is reported. He felt intense pain in the left call and thought he had been truck a direct blow on the kg but examination



Figs. 1 and 5. Roentgrooprams of the right knee show a large polycystic lesion of the lateral femoral conclyle with sharp margins, and smaller cysts above the lateral femoral contribute on the contribute to the notice and possibly at the distal lateral margin of the lateral conclyle, and moderate dense swelling of the capacite. No productive or periodical rescribion is apparent.

showed that he had alld across the road and had been brought to a stop when the sole of his foot struck the curb which had caused forced dorsiflexion of the ankle. There was an incised wound of the Achilles tendon 3 inches above the ankle joint. The plantaris tendon lay slack in this wound and traction on it delivered the tendon and about half of the muscle belly which had been ruptured transversely at about the middle.

This case and experimental work show that this is the usual mechanism of ruptures of the plantars. They are not caused by direct violence but by forcible dorsiflexion of the ankle. Because the muscle belly is very short and the tendon very long the length of the belly being only about one-fifth the total length of the muscle and tendon the belly is subjected to much greater tension than the other calf muscles and ruptures much more easily Audrency G Morean M D.

## SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS ETC.

Du Toit G T., and Ensiin T B: Analysis of 100 Consecutive Arthrotomies for Traumatic Internal Derungement of the knee Joint J Bons Sw1 1045 17 412

An analysis has been made of 100 consecutive knee arthrotomies performed on European miners working underground in the Witwatersrand Gold Mines.

The routine of clinical diagnosis operation and postoperative care is described

The operative findings have been analyzed. In 4 cases no meniscal lesions were discovered at operation in 82 cases tears of the medial meniscus were found and in 9 cases tears of the lateral meniscus were seen. There were double tears in 3 cases and discoid menisci in 2 Of 97 torn menisci 49 were of the bucket handle type.

The operative findings have been correlated with

the signs found at examination

Pain at the anteromedial joint line was found to be of considerable diagnostic significance. Absence of such pain contraindicated arthrotomy for a meniscal lesion.

It was shown that locking is frequently, but not always due to a meniscal lesion. A stub of antenor cruciate ligament was the cause of locking in z case. Meniscal damage may exist in the absence of

wasting
Fouches hot spot on the medial facet of the

Patella is described

The crushing sign is found to be not entirely

Pathognomonic of menuscal damage Erroneous diagnoses and operative complications

have been analyzed in some detail

The end results of treatment are given the deability assessments averaged 16 per cent for the whole series

The penalty of delay in operation has been found to vary greatly according to the type of lesion

The findings in the authors investigation favor early and total meniscectomy if an incontrovertible diagnosis has been made.

From the medicolegal point of view it should be accepted that a very minor trauma may produce a torn meniscus. Although clinical manifestations following trauma may be delayed for months lack of pain does not exclude the possibility of a tear.

The postoperative routine is reported as follows The foot of the bed was raised on 8-inch blocks On the second day active foot and ankle movements were started and on the third day, active quadriceps contractions were begun. Straight leg raising tentimes per hour was initiated on the fourth day and active flexion to the extent permitted by the dressing was allowed on the seventh day. On the twelfth day the stitches were removed and the patient was scated in a wheel chair. Thus the knee was un consciously flexed to go degrees. The quadriceps drill was maintained. The patient was usually able to lift his knee 200 times at one sitting on the four teenth day and beginning at this time he was allowed to attempt walking with the aid of a canc On the sixteenth or seventeenth postoperative day the nationt was formally discharged but he con tinued in daily attendance in the out patient department traveling by bus or tram to the hospital. From the fourth week, the patient was instructed to swim ride a bicycle do antigravity weight-and pulley exercises or atationary rowboat exercises and to walk several miles daily Work was usually re sumed at the end of the sixth or the seventh week ROBERT P MOSTGOMERY M.D.

#### FRACTURES AND DISLOCATIONS

Tordoir, B M and Moeys, E. J. Medullary Nail for Fractures. J Am II Ass 1045 198 702

The use of a VAA steel nail was introduced in 19,00 by Kuentscher. In 1944 Boehler published his book which gave the results with the use of the VAA nail in 500 cases. The type of fracture which responds best to this method of treatment is the transverse fracture of the disphysis as the nail is fixed in both epiphyseal ends without injuring the articular cartilages. A few days after this operation the patient is able to walk about and leave the hospital. This method gives an exact reduction of a transverse fracture. The nail may be used in compound fractures if they are treated within a penied of 10 hours. It has also been used in the treatment of pseudar throses.

Before the operation an x ray examination should be made of the length of the bone and the width of the medullary cavity Reduction is carned out on a special frame under fluoroscopic control. In the femur an opening is made in the trochanteric fossa with a piercer and a thin stiff nail is pushed through the medullary cavity and beyond the fracture line into the distal fragment. The huentscher nail vs slipped over the thin wire, and the wire is then removed. For fractures of the tibus a week spot just In the second gr uj a perfect cure was of tained in 12 of 13 cases. Only 1 patient had a considerabl varies position of the broken clow. In a cases the reduction was poor and yet the function was excellent.

In the third group 12 out of 22 patients treated in a conservative manner had perfect function while 18 underwent an operation and only 2 of these had impaired function. In 1 case the operative reduction falled and yet the functional result was expellent.

The author highly recommends roentgenograms taken in anteroporternor direction with the elbow flexed because only this method furnithes informs too as to the rotation of the peripheral frament in

relation to the humerus

As a rule peroseteum remains attached to the short distal fragment but the sharp end of the long proximal fragment becomes denuded. The author is of the opinion that the absence of periosteum is responsible for the gradual disappearance of this sharp end. No limitation of fierson was observed in patients in whom, due to an unsuccessful reduction the proximal fragment remained located entirely in front of the distal fragment.

Patients with the elbow in a varus position had no complaints as to function and were occasionally operated on solely for cosmetic reasons. Cabitus varus may follow immobilisation of the fracture in suplisation.

The author is opposed to the use of allogs or plaster-of Paris splints in cases in which the fragments have lost contact with one another

A valgus position or ischema was not found in the

Westerborn, A. Nailing in the Marrow Cavity in Cases of Recent Fracture and Pseudarthrosis-Report of 28 Cases. Act chir scend 944, 90 89

In 1940 Kuntscher reported his method of treating fractures by inserting a nall into the narrow cavity At first it was severely criticized but later quite widely adopted in Germany. The 18 cases reported by Westerborn, 14 of recent fracture and 14 of yeard arthrosis are the first cases published from the

Scandinavian countries
The principle of the method is to fix the fragments after reduction by inserting a nail into the marrow cavity. As the nail is driven in from an incision at a distance from the fracture open reduction is not necessary. It is not a large round nail that afts the marrow cavity but a U or V-shaped nail that acts in about the same way as the 3 flanged nails used in fractures of the neck of the femur. It touches the endosteum only at three small points and therefore from fixation. An illustration of the nail in place is given in the original article.

This method can be used in all transverse blique, and spiral fractures of the long bones especially of the femur. For the femur the nall is inserted from the upper surface of the trochanter either through the skin r through a mall nerson. In the other long bone as small hole must be borted in the cortical color bone, as small hole must be horted and the control of the control of the color of the color

As it is unnecessary to expose the fracture in this method there is little danger of infection. If m fection occurs it results in localized satellits, never in diffuse orteonyviltis. There is luttle risk of fat embolism. Only a deaths from this came have been reported in the literature. Bone besling occurring promptly in all of the author's cases of recent frac

He had good results in the cases of pseudarthrosis also the method ensures absolute stability and per mits of early weight bearing, two conditions necessary for healing. The ends of the bones should be fireheared and any tissue between them removed. Six of the cases of pseudarthrosis were in war veterans and involved the femur they had penisted for from 'f to 3 years and resisted other methods of treatment. Bone healing took place in all 6 cases. Osseous healing occurred within 3 months in a case of pseudarthrosis of the humerus Four cases have been operated upon so recently that the final results cannot be findered.

Sandegard E.: Fracture of the Lower End of the Humerus in Children—Treatment and End-Results. 4st ch. mand 943, 59

At the Children a Hospital in Gateborg Sweden where the author is Surgeon in-chief, the trest ment of fractures of the elbow has been different from that unsulty described in the literature. He discusses a groups of fracture of the lower end of the humerus sent from 190 to 1910. These incl det 154 cases of supracondyfar fracture 40 feeding expended in fracture and the pricondyfar fracture 40 medial condriar fracture y of transcondyfar fracture 40 medial condriar fracture y of transcondyfar fracture. The latter are extremely rare while comminated fractures and Tan M a shaped fractures are practically never seen in children as they insually occur only when there is a certain degree of bose fragility.

Of these patients 189 were re-examined later. Most of them had been treated surgically. Firstion as a rule had been carried out with Ruleira stainless steel nails which proved very effective. These were always extracted within three weeks. Catgut is not strong enough for operations on bones.

Two-thirds of the case of supracondylar fracture were treated surgicially. The forearm had to be immobilized in semipronation after operation be cause of the risk of al poung of the fragments. The functional results were very good but a considerable number of cases showed cubitus varus and a few cubitus various.

Great emphasis i placed on the necessity for accuracy in reduction. Faulty red ction is the cause of practically all the pathological changes that take place at the angle of the elbow after operation Accurate reduction is sometimes quite difficult in these cases. And a excellent results are sometimes obtained by conservative treatment operation can not be recommended unconditionally except in very stubborn cases

Over 60 per cent of the cases of lateral condylar fracture were treated surgicall) The results were very good and extirpation of the fragment was not found necessary in any of them. As there is a risk of pseudarthrosis in these cases with conservative treatment, operative reduction and fixation is

recommended.

Because of the necessity for exact reduction in intra-articular fractures extraction of the fragment is necessary in most cases of medial condular fracture and transcondylar fracture. Good results are obtained with this method

Generally it is not necessary to extract the frag

ment in medial enicondular fractures. Immediate repair of the torn capsule and ligaments is possible by a very simple operative technique and good results are obtained Roentgenograms of a number of illustrative cases

are given in the original article and a useful method of interpreting roentgenograms is discussed

AUDREY G MORGAN M D

#### McKeever F M : Fracture of the Femur in Adults. J Am. M 421 1945 128 1006

Mckeever reports his observations on 47 patients suffering from closed fractures of the shaft of the femur in a military group between the ages of eighteen and forty. While the author did not initrate the treatment instituted all patients were eventually placed under his care. Twenty three patients were treated by suspension and skeletal traction (Kirchner wire or a variation of the Steinmann pin) Open re duction was done in 17 cases—in 7 of these it was used after other methods falled (in the surgeon s

opinion) to produce satisfactory position.

Seven patients were treated by external skeletal fixation with the use of some mechanical device. All patients were followed up from six and one half to twenty four months. The average period of time chapsing between the injury and the date of evalua tion was twelve months. The average period of re cumbency for patients treated by internal fixation was one hundred and eighty five days by external fixation one hundred and sixty-eight days and by trac-tion one hundred and forty five days. The period of protection is the time between the injury and that when the patient is able to bear full weight without braces or crutches. The average time of total protection in the group treated by traction was two hundred and nineteen days, of those treated by plat ing two hundred and sixty six days and of those treated by external skeletal fixation three hundred and seventy days.

The roentgen evidence of bony union appeared in an average of two hundred and thirty three days in

23 femura treated by traction. In a patients treated by internal fixation it was three hundred and three days and in 7 patients treated by external skeletal fixation it was three hundred and seventy four days. The criteria for bony union are obliteration of the fracture line and re-establishment of the bons tra beculae. No patient treated by traction had any loss of motion in the hip andle or foot. The average arc of flexion of the knee in 23 patients treated by traction was for degrees. In 17 cases treated by in ternal fixation the average are was 85 degrees and following external fixation it was 78 degrees

There was no loss of length in patients treated by external skeletal fixation but 3 patients, or 17 per cent, who were treated by internal fixation and 5 patients or 21 per cent who were treated by true tion showed varying amounts of shortening. In a patient this shortening was sufficient to produce

disability

The results of treatment as judged by disability resulting from shortening of the extremity from loss of motion in the knee and other joints, and from the degree of muscular atrophy in this group showed that both external fixation and internal fixation were definitely inferior to traction

Complications were most frequent in the group treated by open reduction and internal fixation. The complications included osteomyelitis postoperative infection, thrombophiebitis nonunion broken and bent plates and palsy of the peroneal nerve. By percentages, 13 per cent of the complications occurred in patients treated by traction 53 per cent in those treated by internal fixation and 57 per cent in those treated by external fixation.

From these studies McKeever points out that the safest method of treatment for fracture of the femur for the average surgeon in the average hospital is traction, and that open reduction should be reserved for those cases in which there is definite evidence of soft tissue interposition. The general use of appara tus designed for external fixation and ambulation is likely to delay union and carnes the great risk of producing esteemyelitis at the sites of the fixation pins

BENTAMIN GOLDMAN M D

#### Mobers E. On the Operative Therapy and Prog notis in Fracture of the Patella. Acta chir scand 1044 00 \$95

From 1918 to 1923 104 cases of fracture of the patella due to accidents at work were reported to the National Insurance Office Forty four of them were treated surmeally. Only those subjected to opera tion are considered in this attempt to determine the results of treatment. These fractures require a long time to heal and there is considerable danger of per manent disability. The average time from the date of the accident until the resumption of full time work or settlement by the granting of compen sation was 164 days. The average annuity granted the injured workmen was 21 per cent

A clinical study was also made of the at surviving patients representing the operative material (23

Officers messes are generally catered for by onn tractors and therefore supervision of the kitchens is seldom effective. When an officers mess is staffed by Army personnel the cook is an Indian, and although he may have been instructed in kitchen hygiene in the absence of proper supervision he will revert to unhygienic methods. Of course, all messes are subject to inspection, which in the case of officers messes under war conditions, is irregular and often perfunctory Foodstuffs for officers messes are often purchased from local bazzars, and uncooked or cold food is frequently esten. Unlike conditions in the other ranks where each man uses his own mess tin and other eating utensils communal eating utensils are used in the officers messes, and these are seldom hygienically clean because boiling water is lacking for washing up purposes.

When travelling officers use the restaurants on trains and in stations extensively since they sedom carry rations and do not have the use of the station canteens. In off-duty bours also the officer is subjected to greater risk in that he eats away from his mess to a greater extent than other ranks horter and clubs are mainly or exclusively used by him and the officer class on leave tends to eat more cold or uncooked dubses than other ranks during like pe-

roods

'An instance is cited of a hotel in South India
much used by officers in tran it the kitchen of this
hotel (unscreened) faced on an alley immediately
contiguous to two open latrines f the Indua type

Within a few days in the fall of 104, 7 cases of 1 in omyelitis developed here, 1 of which was apparently transmitted earthsively by flomities. Shortly before this outbreak 32 voong officers arrived on leave at the hotel. Two of them had contracted policomethin after swifeting from distribution for several days. At a later date 2 of the remander answered a question naire regarding their health during their star in the botel. All were fit on arrival, but after three or four days 8 of them felt ill with headache 4 had durings and a sore threat and 2 had in addition, ferry and pain in one leg. The symptoms were severe enough pain in one leg. The symptoms were severe enough

Although the author does not minimize the posibility of case to-case transmission in the acute stage of poliomyellits and the transmission by fouriers be thinks it is important to consider food and esting utensils in the spread of the disease and recommends

the following measures

s An improved standard of hygiene in all messes elimination of contractors from messes employment of British cooks whenever possible and improved washing-up facilities.

2 A further warning to British troops of the risk which they run by the consumption of certain arti-

cles of uncooked food during the fly sesson.

3. The introduction of modern methods of kitchen hygiene in all drillian-controlled establishments in cluding railway restaurants and a closer supervision of the Army kitchens by the medical officers.

Ingrall Bernary M.D.

## SURGERY OF THE BLOOD AND LYMPH SYSTEMS

### BLOOD VESSELS

Farifias, P L.: Retrograde Arterlography in the Study of the Abdominal Aorta and Iliac Arterles. Surgery 1945 18 244.

The author's original technique of retrograde ar tenography whereby a rubber catheter is passed from the iliac artery to the desired level in the aorta was described in the 16th volume of the American Journal of Rossigenelogy At present in view of the difficulties in obtaining rubber catheters he has been compelled to change his technique to the present retrograde abdominal aortography With this technique the patient is given a barbiturate the night before the operation, and morphine hypoder mically one hour before the injection whereupon the femoral artery is exposed by blunt dissection, under local anesthena at the level of Scaroa's triangle, and punctured with a trocar 1 t mm. in diameter Through this trocar is now injected directly and in from 21/2 to 3 seconds, 50 c.c. of a 70 per cent solution of diodrast after tourniquets have been placed at the roots of both lower extremities. In certain cases the Trendelenburg posture may be necessary With a trocar 1 5 mm in diameter and a constant pressure of 15 pounds which the author secures by a specially designed apparatus 25 c.c. of the shadow mixture are injected per second but the speed of injection is modified to suit the individual patient when necessary. The first plate is taken when 40 c.c. of the opeque substance have been injected, and a second immediately afterward, by means of a fast plate changer. When the injection is finished, the trocar is withdrawn a stitch placed in the adventitie of the artery at the site of the punc ture, and the wound closed

In the study of the aorta and iliac arteries the most frequent lesion encountered has been atheroma, the characteristic picture of which was elongation and dilatation of the vessels and stenosis caused by lesions of the intima and by secondary calcification. Atheroma is usually found in old age and the lemons are generally seen all along the vessels, being more prominent in the aortic cone and

in the lifac arteries.

In addition to the great accuracy with which this method of artenography permits evaluation of changes in the arterial contour the presence of aneuryams and their degree of canalization it also depicts in cases of complete obstruction of the sortic cone the characteristics of the consequent collateral drealation. According to the author this consists of anastomoses between the internal mammary and the epigastric arteries, and between the circumflex fliac and the lumbar arteries.

No accidents have been experienced with this method even in patients in very poor physical con

dition with advanced arterial lesions

Pathological changes in the visceral branches of the abdominal aorta will be presented in another article. JOHN W BRIDMAN M D

Helfetz C. J : Traumatic Ansuryam of the First Portion of the Left Vertebral Artery Ann. Surg 945 122 103

A case report of a traumatic ancurvam of the left extracranial vertebral artery in which a complete cure resulted from an autogenous muscle transplant placed directly into the sac is presented with men tion of the available literature on this subject.

Nearly all ancuryams of extracramal vertebral ar teries result from traumatism, either guntire or stabbing. The artery arises as the first branch of the ascending portion of the subclavian artery and ascends obliquely along the lateral margin of the ion gus coli to enter the foramen of the sixth cervical transverse process. The extraspinous portion is about 114 inches long and hes beneath the thyrocer vical trunk carotid artery and internal jugular vein and the omohyoid and sternocleidomastoid muscle. Injuries to the vessel in the portion passing through the transverse processes are the most fre ovent.

The preoperative diagnosis is most difficult to make, frequent ligations of the common carotid ar tery having been performed by mistake. A pulsatile swelling in the posterolateral part of the neck following trauma is the usual history Dissection is often difficult but arteriography by injecting into the sac may establish the origin of the swelling. No one surgeon has had sufficient experience to design a dependable approach for surgery The singular course of the artery and its spacious anastomosis to the analogous vessels of the opposite side, and the connections with other branches and the circle of Willis, account for the inadequacy of proximal and dutal ligation alone as treatment, and the difficulty of extirpation. Extirpation is at best hazardous and ardyous The method of incision and tamponade with gauze impregnated with astringents or antiseptics and the use of muscle transplants have been most often resorted to and have been most successful. With the latter method recanalization is said not to occur proliferative endartents obliterates the aneuryam A variety of less radical procedures have been tried including injection, irritants and sclerosing media electronuncture, and electrolysis Endoaneurvamorrhaphy was employed only in Spath a r case

This case report represents 1 of 15 on aneuryam of the extraspinous portion of the vertebral artery;

a cure was obtained

A twenty-seven year-old negro female appeared shortly after being stabbed in the neck over the sternocleidomastold muscle. The instrument was a thin bladed pocket knife. Her blood pressure was 120/80 pulse 88 and temperature 98 6 Two at

tempts to control bleeding from an unlocated bleed ing point were made, followed by packing (open) and a pressure dressing Two days later it was possible to close the wound by suture. The patient was discharged on the third day to be readmitted on the eleventh because of a pulsating mass, steadily increasing in size since five days after she left the hospital. She was aware of a roaring in the ear and pounding in the neck, which kept her awake at night. The faceration was well healed. Loud systolic and diastolic bruits were heard and a loud systolic apical murmur was also heard. It was thought that the lesion was an arteriovenous aneurysm between the left common carotid artery and the inter nal jugular vein, or a saccular aneurysm of the common carotid artery The laboratory studies con tributed nothing

The first attempt to holate the sac and its tributaries was given up after two-and-one half hours because of dense fibrous adhesions and the large size and extent of the lesson. The postoperative course was uneventful except that the aneurysm grew in size and the symptoms increased. The second oper ation was performed through a more extensive in cision, including the old one in it. Accidental onening of the sac was controlled by insertion of the index finger which also made it possible to find that the aneurysm originated medially and posteriorly against the vertebral column. Ligation of the verte bral artery at the subclavian, which was also ligated proximal to this branch was done by extending the incision and removing part of the clavicle and ster num. Distal ligation was prevented by hemorrhage, therefore tamponade with live muscle transplants was done and the wound in the vessel was closed. The pulse and blood pressure was maintained by means of blood and fluids given during the procedure which required four hours and forty minutes. Convalescence was relatively uneventful, the aneurysm decreased in size and the only complaint was slight weakness and an ache in the arm.

JAY P BARTLETT M.D

Bauer G: Thrombosis following Leg Injuries.
Acts chir scand., 1944 90 9

A study of thrombosis at the Mariestad Hospital, Mariestad, Sweden show that a little over a fourth of the cases of thrombosis occur following injuries to the leg. It may occur in as high as a per cent of patients who have suffered injuries of the leg. This frequency of thrombosis in leg injuries is doubless partly due to the prolonged rest in bed but the author believes that the chief etiological factor is the retardation of the blood flow in the popilical vein caused by swelling of the soft thaues around the knee which results in pressure on the popilical vein. This theory is supported by the fact that the thrombosis practically always occurs in the injured leg

Diagnosis in these cases is difficult as the symptoms of thrombosis may be confused with those caused by the original injury Doubtless before the introduction of venography many cases were not diagnosed and the whole series of post thrombotic sequelae uset as swelling, inductation, and leg uncern occurred in cases in which they might have been pervented. In addition a patient with undiagnosed thrombosis may die suddenly from pulmonary em bolism. Therefore, it is very important to make a diagnosis of beginning thrombosis, and the author believes it is justifiable if thrombosis is suspected, to cut the plaster bandage in order to make a thorough chilical and vecographic examination. The risks from this procedure are much fewer than those from as undiagnosed and untreated thrombosis.

The best treatment for post traumatic thromboals is preventive and consists of raising the foot of the bed and having the patient make alternate stretching and relaxing movements of the muscles of the leg, which he can do even with the leg in a cast. Bandages should not be allowed to constrict the region around the knee Of the specific agents available for the treatment of thrombours, beparin seems to be the best. As a rule heparin treatment is given for 5 or 6 days - 3 doses of 150 mgm. each are given the first day then for a few days morning and evening doses of 100 mgm. and a midday dose of 100 mgm. are given. When temperature becomes nor mal the dose is reduced to two injections of 100 mgm. each and on the last day only one injection of too mgm. is given. However these patients can often not get up at the end of the hengrin treatment on account of traction apparatus or casts therefore the heparin treatment may be continued with small doses to prevent recurrence of the thrombosis,

Thirty-three cases of post traumatic thrombonis have been treated with beparin at the Mariestad Hospital in the past y went. Only a patient died, a woman of 70 who had pulmomary embolism before the beparin had had time to take effect. In all of the other cases the diease did not apread be youd the area involved at the time treatment was begun. The use of heparin has reduced the death rate from pulmonary embolism at this hospital from y and so per cent to 3 per cent, and the probability of post-thrombotic after-effects has been practically abolished.

Borgstrom, S.: Prothrombin Index after Operation, Acts chir mand 1941 89 68.

Heretofore studies of the effect of operation on blood prothrombin have been chiefly in cases of obstructive jaundice, and it has been shown that there is a considerable decrease of prothrombin (sometimes amounting to as much as from 10 to 40 per cent) in these cases.

The author studied the effect of operation on the blood prothrombia level in not patients without reterms using Lehmann's inferomodification of Quick's method of determining prothrombia. The cases were ones of chronic disease and the patients had been kept in the hospital for some time before operation, so that they were on the same diet and had had uniform treatment. Patients who had brea given vituarin K or blood transmissions were cr

cloded, as it has been shown that blood transfusion affects the prothrombin level for from 6 to 12 hours

No decrease in the prothrombin level was found on the day after operation and the amount of blood lost during operation did not make any difference It has been claimed that a decrease of prothrombin s caused by the loss of blood. The loss of half a liter of blood by means of phlebotomy had no per ceptible effect on the prothrombin index.

The anesthetics used by the author in these cases seemed to have a certain effect on the prothrombin kvel. There was no decrease after operations in which local or lumbar anesthesia was used but there was a small but definite decrease after opera tons under nitrous oxide and ether. The maximum decrease was on the fourth day after operation.

AUDREY G. MORGAN M.D.

## BLOOD TRANSFUSION

Maut, G., Barrow M L. and Abbott, J M Results of Routine Investigation for the Rh Fac tor Brit 1 J., 1945 2 273.

From routine examinations of blood information has been accumulated on the incidence and import ance of the Rh factor In the first series (2 944 cases), 84 per cent were Rh positive and 16 per cent were Rh negative In a second series (2,472 cases) in which further subdivisions of the Rh factor were made, 83 3 per cent were Rh-positive 14 9 per cent were Rh-negative I per cent were Rh and o 7 per

Of 136 women with infants presenting either a antory or serological findings suggesting hemolytic anemia, 120 (88 2 per cent) were Rh-negative. The red cells of 55 affected babies with Rh negative mothers were available for examination in 53 they were Rh positive and in 2 they belonged to the sub-group Rh- negative. Anti-Rh agglutinins were found in the serum of 94 (79 6%) of the 120 Rh negative women. In the remainder no anti-Rh agglutinus could be found even though tests were made under

varying circumstances during and after pregnancy The first pregnancy of 80 of the 120 Rh-negative mothers ended with a child normal at birth and dur ing infancy In 27 cases the child was suffering from bemolytic disease or was still-born in 5 the preg mancy ended in a miscarriage and in 8 the child ded from unknown causes or from causes other than hemolytic disease of the newborn. Of the 80 normal first children, 33 were Rh-positive 5 were Rh nega tive and 42 were not tested

Reactions were reported in 48 patients after the transfusion of blood of the compatible ABO type 28 occurred in Rh-positive patients and 20 in Rhnegative patients Of the so Rh negative patients lacinded, a had previous transfusions with known Rh-positive blood without any reactions. The transfusions with the continuous continuous and the continuous continuo fusion of Rh-negative individuals with Rh-positive blood is a not uncommon cause of relatively mild reactions and may result in more severe reactions

LUCIAN J FROMDUTT M.D.

Volkert, M and Piper J : Heparin Content of the Blood in Clinical Thrombosis. Acts chir mand., 1943 89 417

Experiments on rabbits have shown that certain operations on the veins might produce an increase in the heparin content of the blood. In the authors experience, however this did not occur unless factors which cause congulation such as sutures of thick silk through one or more of the veins were used during the operation

It was therefore believed worth while to make a clinical study to determine whether such increase in heparin content could be brought about by operation in man. The heparm content was measured by de termination of the antithrombin content of the blood

Details concerning the results obtained in 33 cases are shown in a series of tables From these it is evident that the heparin content of the blood in man increases only in very serious and dangerous throm botic conditions such as for example relapsing in farction of the lungs in which after a certain latent period, there was an increase of the heparin content to double its normal amount.

It would seem, therefore that an increase in heparin content of the blood has a certain value in prognosis but the available material is insufficient to permit of final conclusions on this subject. Since the human body apparently tries in certain cases to counteract dangerous thrombosis by increased production of heparin, it is possible that heparin medi cation may be indicated to support this defensive AUDREY G. MORGAN M.D.

Reich, C. Yahr M.D., Eggers, C. and Lipkin R.: Dicumerol in the Prevention of Postoperative Thrombosis and Pulmonary Embolism Sur gery 1945 18 238

During the period from October 1943 to July 1044 in an effort to further evaluate the use of dicumarol, the authors subjected a series of surgical patients (ros cases) to a prophylactic course of the drug with the thought of preventing postoperative thrombosis and pulmonary embolism. During this same period the drug was used in the treatment of cases of venous thrombours (33 cases) and pulmonary embolism (o cases) which arose in the surgical serv iœ

Since the statistics show that this condition does not begin until approximately the sixth or seventh postoperative day it was believed best to start the drug on the third to the fourth postoperative day In this way the prothrombin time was not prolonged at the time of operation and a few days were permitted to elapse postoperatively in order that healing might begin. That this time namely the third or fourth postoperative day was the most opportune day to administer the drug was shown by the fact that neither thrombotic phenomena nor postoperative bleeding were found,

Before administration is started, a prothrombin determination is done to find the patient's normal blood level After this has been established, 300

mgm. of dicumarol are given then on the following day a prothrombin level is done again and unless it is markedly prolonged 100 mgm of the drug are given at this time. The object is to prolong the prothrombin time to twice its normal value. In other words if the normal time is from 17 to 20 seconds the therapeutic range would be about 34 to 40 seconds Subsequent doses must be adjusted individuelly. In many cases the prothrombin time is prolonged rapidly and prothrombin determination on the third day shows that the patient is already in the therapeutic range, then it is best not to give any drug on that day and to see what the prothrombin level is on the fourth day if it is still in the thera pentic range, no drug is given on that day either On the other hand, if the prothrombin time is rapidly becoming shorter another 100 mgm, of dicumarol are given. Other patients will be found who do not reach the therapeutic range with the first 300 and 200 mgm. of dicumarol. In these instances 100 mgm. administered on the third day and prothrombin observation is done daily after that Sometimes even to mem are enough.

If bleeding should occur at any time during the period of treatment a transitusion of fresh citrated blood, plus 60 mgm. of water-soluble vitamin K intravenously will raise the prothrombin level

intravenous ocompthy

Salicylates notably aspirin, should not be given at the same time that dicums of is being used

Directions for the preparation of thromboplastin (rabbit s lungs) for the prothrombin test, and for the carrying out of the test are given in the original

article.

From the results of the prophylactic experiments, wherein no thrombotic phenomena in tos sunject operations were experienced, and the results of treat ment of venous thrombosh and pulmonary embolism arising during the period of these experiments in \$501 sunjectal and obstetric procedures, wherein again, dicumantly, carefully administered, resulted in uniformly favorable results (the thrombophichtis clearing up promptly and none of the pulmonary emboli causing futuity) the authors believe that dicumand is a safe means for preventing postoperative venous thrombosis and pulmonary emboliam.

Whether this synthetic preparation should be used routinely is still a matter of discussion nevertheless the authors are convinced that discussion levertheless the authors are convinced that discussion levertheless byte in all cases in which thrombotic complications are likely to arise including extensive pelves opera tions, operations on individuals who have previously shown a tendency to thrombosis. Naturally it is the drug of choice when these conditions have already developed since it is cheaper and more readily available than heparin, and may be given by mouth. However in cases of scute primonary embodism it is proper to administer heparin by vein (see original article for details of techniquo), and start dicumarol by mouth at the same time. This should be done because di-cumarol has a letent percol of from at to 48 boars.

and it is important to have the coagulation mechanism altered by the bepann until dicumerol takes effect

Tables int the average total desages employed by the eathers for each type of operation, and for each type of case wherein thrombotic or embotic conditions have arisen, these desages ranging from yoo to 3 too mgm. Of dictionard. The average number of days in the corresponding therapeutic range viryfrom 4 to 25 days.

Sharpey-Schafer E. P: Transfusion and the Anamic Heart Lence, Lond. 2945 49 295.

Blood transfusion may be an essential life-saving procedure in severe anemia. The main purpose of such transfersions is to raise the oxygen-carrying power of the arterial blood by increasing the con-centration of hemoglobin, and although the exact time is difficult to assess dinical evidence suggests that it is often a matter of days before improvement becomes evodent. Meanwhile there is a period of risk and anxiety for it is well known that patients with severe anemia stand transfusion hadly. Many of these so-called transfusion reactions" appear to be circulatory in origin, since the clinical signs and, in fatal cases the postmortem findings show pulmonary edema. There is good evidence that the beart is not normal in severe anems: anginal symptoms indicate myocardial ischemia the size of the heart in roentgenogram and the weight of the beart, postmortem may be increased and electrocardioemphic changes present.

The author reports the effects of translusion on circulatory dynamics which have been studied by cardiac catherisation, a method allowing serial measurement of the output of the heart, and pre-

sure in the right auricle.

From his observations, the author concludes that in severe anemia the blood volume is reduced, and that the right auricular pressure, cardiac output, and percentage utilization of available arterial oxy gen are increased

Transfusion raises the right apricular pressure and in normal subjects increases cardiac output, but in severe anemia cardiac output may fall. Acute pulmonary edema follows in some cases and the

blood pressure may rise.

The author suggests that the heart in severe anemis behave like Starling's overloaded heart lung preparation. Starling showed that, if the rate was kept constant, raising the venous filling pressave caused a parallel rase in cardiac output until a point was reached at which a further rise in pressave caused no further rase in cardiac output, and at still higher venous pressures a fall in cardiac output, and at still higher venous pressures a fall in cardiac output resulted. In severe anemis the heart seems to respond as in this last place, so that when the venous filling pressure is further raised by transfusion, the result is a falling cardiac output.

The purpose of translusion in severe anemia it long term benefit from increased arterial oxygen content, while venous filling pressure is raised as

little is possible hence the small slow concentrated maximon. Other suggestions include the propped up cardiac posture and clinical observation of JOSEPH K NARAT M D

Frisch, A. W Hemolytic Transfusion Reactions Due to the Rh Factor Report of 2 Cases. Am J M Sc 1945 210 184.

In a patients severe reactions following multiple massisions were found to be due to the Rh factor The first was a 24 year-old white male with Hodg im's disease, and Group O and Rh negative blood who received 4 transfusions within 18 days without presenting any reactions Four days later an admini mation of washed red blood cells resulted in hives dynaes and icterus During the following 20 days, the patient received 4 transfusions of citrated blood and a red cell infusions each followed by chills and ker One week following the last transfusion a sum aggiutinin was detected and tested against 127 known bloods of all groups The patient s serum proved to agglutinate 69 per cent of the bloods tested among them being 5 Rh negative bloods This finding is known to be characteristic for serum

designated by Weiner Sonn, and Belkin as anti-Rhi The second patient a 22 year-old white male with mustic anemia received 15 transfusions during a priod of 10 months at least 5 of which consisted of th-positive blood. Four months later transfusions had to be resumed but the patient showed severe nactions to small quantities of blood which proved to be Rh-positive. The patient was found to be Rh equive and therefore, received subsequently only spatire donor's blood (13 transfusions) Subse quently due to lack of Rh negative donors, a transmion of Rh-positive blood was given. This was bloved by weakness nausea vomiting acterus amaturia and hemoglobinuria. The patient's conchan improved after the administration of fluid Emmination of the patient's blood did not reveal my Rh positive cells but his serum was proved to months blocking antibodies as described by Riener and Race. These inhibiting antibodies are angulating and therefore, cannot be detected direct agglutination tests They have to be dem omitated by the inhibition exerted by the patient s lemm on the reaction between known Rh-positive cels and a known anti Rh serum.

ARTHUR J LESSER, M.D.

# RETICULORNDOTHELIAL SYSTEM

lone, J. L. Kirkpatrick, H. J. R. Lederer H. and Lays, D G: Familial Crises in Congenital Hemolytic Disease. Lance Land 1945 249 33

Acute hemolytic cruses form a well-recognized part of the symptomatology of familial acholune jaunto, but the literature contains few records of these that arming almost at the same time in several numbers of the same family

The authors report an instance in which a sons dughters and the mother in a family of 7 mem

bers developed acute hemolytic crises of great severi ty within a period of a few days of each other. At almost the same time a cousin of these children was

The authors made a very thorough study of these cases but no explanation could be found for their simultaneous appearance DAVID H. LYNN M D

James, D. F., and Evans, L. R. Splenectomy for Acquired Hemolytic Jaundice in the Aged N England J M., 1945 233 143.

The authors present the case of a seventy year-old woman who, four months prior to her admission to the hospital first experienced malaise increased weakness fatigability palpitation and shortness of breath on exertion. On admission the patient appeared to be severely ill as evidenced by prostra tion tachycardia pallor and a lemon yellow skin The tongue was smooth and pale The blood pres sure was 130/40 There was present a loud blowing apical systolic murmur The liver and spleen were

Of the significant laboratory data the red cell count was 870,000 with 17 per cent reticulocytes The white cell count was 17 500 and the differential count was normal. The hemoglobin was 32 per cent The icteric index was to and by the Sanford method of erythrocyte fragility determination, hemolysis began at 0.44 per cent saline solution and was com plete at 0 34 per cent both values being within the limits of normal, and equivalent to those of a normal control blood tested at the same time When how ever enough plasma had been removed from the blood of the patient to make the hematocrit reading normal-that is 40-and the fragility was again tested by the Sanford method it began at 0 50 per cent and was complete at 0.40 per cent, values definitely indicative of greater fragility than normal

In order to check the findings of these naked-eye tests the photoelectric method of Hunter was used ie blood with a hematocrit level of 17 was tested When fragility was determined by this method hemolysis began at 0.60 per cent saline and was complete at 0 36 per cent, whereas in the normal con trol it began at 0.48 per cent and was complete at o 34 per cent. The blood smears showed anisocy tous macrocytes polychromatophilia stippling and a few erythroblasts and normoblasts. No sphero cytes were seen. Routine x rays were negative Gastric aspiration revealed free hydrochloric acid

Liver extract and multiple whole blood trans fusions gave little improvement and therefore x ray therapy was administered on the supposition that the etiological process might be neoplastic in nature This however resulted in a decrease of the white count and was therefore discontinued Meanwhile the patient developed a severe pain in the right upper quadrant which was interpreted as due to obstruc tion of the cyatic duct.

Because of these findings and the fallure of the patient to respond to the vigorous transfusion therapy she was transferred to surgery for splenec

tomy At operation the gall bladder was tense and distended but no stones could be palpated. It was not removed. The spheen was removed and the pathological report was consistent with that of a bemolvitic amenia. She was discharged on the twenty-account postoperative day remarkably improved, with a red-cell count of 4,500,000 and at 5 gm of hemoglobin. The letteric index was 14. Although abnormal red-cell fragility penisted she was entirely well and more vigorous than she had been in the previous ten years.

The authors point out that an erroneous result in red-cell fragility was obtained in the presence of marked anomia. They suggest that a more accurate test, such as Hunter's replace the more widely used

Sanford test in these cases

The diagnosis of congenital and acquired bemoyitic jaundic is discussed and the authors state that a case of hemolytic jaundic should not be termed congenital until evidence is found in the family of characteristic symptomatology or of microspherocytosis or increased saline fragility was pathogomonic of congenital interns but believed it might be regarded as a regeneration phenomenon or as a sign of the action of toxic or hemolytic forces on the red cells in the dreutation. Ham and Castle suggested that crythrostasis in the spleen and other orgam would account for increased fragility. These observations demonstrate the difficulty in determining the fundamental nature of a hemolytic jaundice from fragility studies alone

In the authors case the most cogent points that argued against the congenital type were a sudden appearance of severe hemolytic arems in old age and the absence of a familial history and the pubolog real picture of the sphen was not characteratic of compenial hemolyte jaundlee. Therefore the diagnosis made was relatively scatte hemolytic anemia of the acounterd variety

A study of the literature revealed reports of 14 patients in whom the onact of hemolytic jaundice occurred at or beyond the age of fifty only 1 of these patients was beyond the age of seventy. Five patients showed definite improvement after splenectomy in the other 9 patients splenectomy was in-effective.

The case reviewed from the literature as well as the one reported by the suthorn demonstrate that splenectomy may have the lives of elderly patients with acquired hemolytic jaundies. Although good results following splenectomy are more likely to occur in patients with increased crythrocyte in gillty spherocytosis and a splene typical of congenital hemolytic jaundies splenectomy is some times of value in patients whose clinical picture lacks one or more of these characteristics.

DOUBLAS R. MORTON M.D.

## SURGICAL TECHNIQUE

#### OPERATIVE SURGERY AND TECHNIQUE POSTOPERATIVE TREATMENT

Schwartz, L., and Mason H S: Cleansing of Oil Covered Skin and Burns. Arch Surg 1945 51 55

In this investigation of the cleaning of oilcovered skin and burns 165 surface active agents commercially available, were systematically studied. Some 350 mixtures of single surface-active agents or surface-active agents in combination with both light and heavy liquid petrolatum (purified mineral oil) were the subjects of approximately 700 tests of comparative activity in removing heavy fuel oil and tar from the akin. The test oils employed were heavy and light fuel oils.

Three mixtures of surface-active agents were found capelle of completely removing heavy fuel oil, without estensible mechanical action in the course of 3 fifteen minute applications on surgical gause, but were also found to have poor detergency. Dioctyl sodium sulfosuccinate in 10 per cent light liquid petrolatum solution had good detergency and high activity as an oil remover in dressing form a sample of the surface of th

Kelly R. P Rosati L. M and Murray R A.:

Traumatic Osteomyelitis the Use of Skin Grafts. Ann. Surg 1945 122 1

A technique for the skin grafting of outcomvehitic cavities following saucerization was employed in approximately 100 outcomveilitie wounds over a twoyear period at an Army General Hospital. Beneficial results were obtained in the majority of cases

First every effort is made to improve the patient a graeral condition. Saucerization is then carried out in a manner analogous to the débrudement of a fresh wound In addition, the wound topography must approach a saucer shape to attain this one should not heatate to ascrifice bone, provided that in so doing the surgicially created bone weakness does not exceed the pre-existing weakest link. A complete removal e hole of all unhealthy tissue and of all foreign bodies is desired. Any remaining tussue which appears to be of low vitality should be removed Finally, any tendon denuded of its sheath or any exposed ligament which will not contribute to the anticipated function of its joint, is exceed. If such a structure is vital an effort is made to cover it with a flap of local healthy skin.

The postsaucerisation dressing consists of a layer of time mest pauze in direct contact with the wound. Over this is packed a suitable mess of mechanic's waste and then an Ace bendage a applied with as much pressure as the wound can stand without employment of the circulation. A thick layer of these transfers in the circulation are the about pressure of the circulation and the circulation of the content of the circulation.

immobilization is done with plaster

Skin grafting is usually done four days after saucerization . Uniformly healthy granulations, however thin which are visible after four days of pressure dressing are an index of a healthy wound likely to respond favorably to grafting. Grafts are cut with the Padgett dermatome. When they are applied to the wound cavity wrinkling must be avoided as well as tension. When plecing of the grafts is necessary untied running autures are placed with one end left long. These can be easily with drawn when the graft has become firmly adherent to its bed. The margins of the graft are sutured to the skin edges with nonabsorbable material. With two exceptions the dressing is essentially the same as that after saucerization Bono-acid gauze is preferred for contact with the graft and somewhat less pressure is applied. Better results have been obtained when the dressing is irrigated either with weak acid solution or with 1.250 penicillin. The dressings are removed in four to six days according to the amount of exudate present and most dressings with bone acid or penicillin are continued until complete epithelization has occurred.

In evaluating the results of a skin-grafting procedures in a patients it was considered that they were poor in only as per cent. In the remaining 76 per cent a satisfactory take with progressive healing was obtained. In view of the beneficial results in the majority of cases it is believed that the use of skin grafting in traumatic extensivelities has falled to receive the general adoption its effectiveness warrants.

Burks J and Jacobs, T T: Transthoracic Oper ative Approach for Traumatic Lealons of the Spisen Arck Surg 1945 51 18.

Splenic injuries are not uncommon among battle causalities and are usually associated with other intra-abdominal or intrathoracic injuries. Today the consensus is entirely in favor of splenic comy for The preferable incision for splenic tomy in these directionations depends to some extent on concomitant in furies.

While statistics for the authors theater of open nons are not available at present observation of patients admitted from forward bospitals and conversation with other surgeons give the impression that the majority of spienectomies are performed through a vertical left rectus incision on the left side with or without a transverse extension. A few cases have been observed in which a transverse incision has been used. The authors have utilized the trans thoracle route.

At first eight it may seem that, although splenectomy may be feasible through the transitoracie approach exploration of the peritoneal cavity will be at best, limited. Burke and Jacobs have found that it has been possible to explore the entire small

intesting the transverse and descending portions of the colon the stomach and the proximal portion of the duodenum although in 1 case a perforation high on the lesser curvature could not be visualized

The operation has been performed with the pa tient under apesthesia induced with other and oxygen administered endotracheally which permits re-expansion of the lung before closure of the wound. The chest is opened by an anterolateral incision either through the eighth interspace or through the bed of the eighth or the ninth rib Resection of the rib seems to give a little better exposure although with the Flick rib spreader adequate exposure is obtained by either method Phreniclasia is not necessary to produce a flaccid disphragm. The disphragm i incised radially and the spleen is located and brought into the operative field without difficulty. Adhesions may be removed by sharp dissection under complete visual control The pedicle may be ligated en masse or by separate dissection of the vessels, according to the desire of the operator. Any desired further exploration is then performed. The es e with which all manipula tions about the spleen may be carried out is a pleasant surprise and the splenectomy itself is much easier than through any abdominal incision. The disphraum is closed with two rows of interrupted silk or tine chromic sutures. Whether or not the pleural cavity should be drained routinely has not been determined

It cannot be denied that in theory at least there are dangers in connection with this approach which are not a sociated with an abdomical incision. The possibility of empyrems must be kept in musd as well as the possibility of late hemiation through the sutured disphragm. These complications have not occurred in the reported cases nor have the authors beard of their occurrence in the cases of other sur-geoms in their theater of war. Three cases are reported.

#### Major R. L.: The Present Status of the Injection Treatment of Hernis Ass. Sect. 045 22 86.

The revival of interest in the injection treatment of hernia so apparent ten years ago in many parts of the country seems to have subsided to a great degree. The author states that in the last five years he has seen no reports from responsible clinics ad vocating this form of treatment.

In the light of his experience in operating on 60 patients he has come to the definite conclusion that injection treatment has no place in the treatment of hernia and its use should be condemned. In 1914 after being taught injection methods by one of its ardent protagonists he treated a group of 60 patients with 93 hernias In 1937 some 50 of these patients had been followed up and only 11 showed on definite evidence of recurrence but 90 of these were still wearing truses. In a later check-up of these 11 cases none was found to be cured.

Because of recent experiences in treating patients by surgical repair following injection treatment, the author believes that the injection method does not cure hernia, but actually complicates the conditions to such a degree that any subsequent attempts as surgical repair lessen the patients a chance of a cure. Marked shroplasts loss of tissue reciliency semi critisginous rings of tissue and cases of stringe lation are but a few of the complications seen following injection treatment.

JAY P BARTLETT M.D.

Mair G B: Use of While-Skin Grafts as a Substitute for Fascial Sutures in the Treatment of Hernias. Preliminary Report. Am. J. Surg. 1045 Sc. 112

Reigndier Edwards recently presented the modern views on the treatment of legulant hernia in the Brilish Journal of Surgery 11e believes the Bansini operation is inclined and harmful, and that it should be abundomed. In place of it he suggests a physiological repair with high ligation of the sac combined with repair of the torn or weakened tramversalls faseds or a plastic repair with fascial subtret to narrow the internal ring and to strengthen the weakened posterior will of the inguinal triangle Ile believes improvement in results will come not from the evolution of new ideas but from more careful technique better pre and postoperative care and the election of the most suitable method of repair for each case.

This article is a preliminary report suggesting that the use of whole-skin grafts inlaid under tension in such a way as to protect the posterior wall of the inguinal canal and narrow the internal ring may be

apperior to fascia in most cases

Fascial autures were first suggested by McArthur in 1901 when he cut strips from the aponeurosis of the external oblique and sutured with them. His methods since that time have not been extensively accepted, and few surgeons routinely employ this method. Kirschner first used fascia lata in 1910, and Gallie and LeMesurier advanced his work by using special needles. They showed that fascia excited no inflammatory reaction survived many years united with the tissue in which it was imbedded, and did not stretch under pressure as does ordinary sear tissue In a few weeks the fascial strips become surrounded by a film of vascular areolar tissue from which septa of similar tissue penetrate between the folds and into adjacent structures to effect a firm union-a plaque of fibrous time By 3 weeks time the fibrous strip on cross section closely resembles normal tendon-

Edwards gives as indications for fascial repairs (i) all recurrent hernias of any type (a) all primary direct inguinal hernias (5) all primary oblique inguinal hernias with muscle atrophy and weakness the rings and posterior wails (4) all funicular or "addite lag" types of hernia (5) the final stage in the Mayo repair of unbiliscal hernia and (6) the final stage in repair of large ventral or incisional hernias

Since fascia is reserved f r cases most likely to recur the evaluation of recurrence is very difficult. For indirect hermiss it averages 12 per cent. Other writers give figures between 5 and 30 per cent for indirect and between 7 and 42 per cent for direct hermiss. If fascia has been used the recurrences are between 5 and 9 per cent for indirect hermiss and between 7 and 9 per cent for indirect hermiss and between 7 and 9 per cent for direct. Therefore it is clear that even in a less favorable type of case fascia reduces the recurrence rate.

Fascia has the following disadvantages

1 The McArthur method does not give enough tucus to fulfill the requirements of an ordinary case, and it is applicable mainly to the inguinal type of hemis.

2 The Gallie technique involves an extensive high wound or the use of a fasciotome. In either case, there may be intractable pain referred to the thigh and hip joint, and the possibility of an obvious much hermia. The ethology of this pain is obscure, but about 25 per cent of the cases are involved

3 Infection of the abdominal wound more commonly follows this type of herniotraphy (70% of cases with autogenous fascia and 121% of those with

ox (aucia)

4. There is increased hability to develop post operative chest complications in these cases parity because of increased operative time and parity be cause of the decreased vital capacity and muscle spans associated with a plastic response.

5. Fascia unites to fascia under considerable tension, but potential gaps occur between fascia strands and all strands do not unite with one another Recurrences usually occur between strands forming a direct sac (usually close to the medial supect of the causal)

6 The needle used in the Gallie method is large and apt to traumatize the inguinal ligament or

damage the femoral vein.

7 There is a substantial recurrence rate—the figures may be considerably higher in the hands of

many surgeons

Much research has been carried out on the use of sterilized dead fascia which overcomes many of these disadvantages. However this use has not be come very popular as yet and does not seem to have affected the recurrence rate

Rehn and Loewe advocated a method known as cutar graft for the repair of anatomical defects in postoperative hermas. This graft was made of all elements of whit except epidermis and was elastic, inherently active, and composed of a rich network of connective tissue fibers. These factors persus after transplantation and stimulated by the tension under which the graft is sutured it rapidly under goes metaplasia into stout connective tissue. It has

been reported that regeneration is more complete and more rapid than when fasca is used. Unlikin operating on a patients who had submitted to cutts grafts 4 years before found complete metamorphosis of the transplants. The grafts represented normal connective tissue and no hair

folicies or glandular thisue could be identified. There was no evidence of cyst formation. Rehn used this method in 104 operations with 15 cases of wound sepais and 6 poor late results. Canna day declares these grafts are superior to fascia and that the grafts heal firmly and promptly and are easily obtainable. He used these grafts for 37 operations (27 hernias) with only 2 cases showing mild senses and 2 small hemstomas.

Ettner and Peer and Paddock found that it is impossible to remove every bit of the epiderms the apices of hair follocks and the sweat glands remaining. After implantation these disappear and the grafts fuse with their aurroundings through a mechanim of inflammation and aceptic wound healing.

Many investigators have shown that epidermis alone implanted in the skin will produce smooth walled cysts which contain no dermal elements. Peer and Paddock and Rehn and Cannaday and his associates have done work showing that the method is entirely safe and the risk of epidermoid cyst for mation is remote. It is important that the grafts be placed under tension since metaplasia is then much more rapid and complete.

Rein originally denuded an area of the thigh of epiderms with a Thiersh razor and cut the cutis graft from this. The edges of the resulting wound were devoid of epithelium and healed slowly when closed. The author wondered if it really was necessary to remove the epiderms and investigated the use of whole-skin grafts autured under tension in guincaping and rabbits. At the same time he applied the operation to a considerable number of bernias in which fascia would have been used.

In 1938 the author first used a whole-skin graft in repairing a large ventral hernia. The first incassured 4 by 5 inches and was sutured to the anterior aspects of 5 inches and was sutured to the anterior aspects of the case of the medical apponeurotic expansions of the external oblique. The repair was firm and satisfactory 18 months factor with no recurrence or other complication. He later used the same method (from 1938 to 1943) on 7 large ventral 3 um blucal hernia and 1 epigastric hernia without complication. Follow-ups have been complicated by the war but immediate results were very encouraging and the author began applying the same methods to the recour of inguinal hernias.

Experimentally the author used whole skin grafts under tension to close fasca defects in rabbits. The first group with hair left to a length of 5 mm when examined five months later showed disappearance of the scheecous glands epidermis and hair follicles. The hairs were surrounded by a massive foreign body reaction and this in turn was energialisted by a firm filtrous stroms. The degree of metaplasis was striking and microscopically the edge of the graft was determined with difficulty Under the microscope a lew attophic swent glands and dermal papillae were seen. The degree of the specific were supplied to the strong the swent glands and dermal papillae were seen. The dermis aboved a dease fibrous tissue infiltration and high va. cultarity.

A second group with the hair shaved off, showed similar findings with a less intense foreign body reaction. No trace of epidermoid cyst formation was seen. Instead, the epidermis was being desquamated and the cells and debris were being removed by phagocytes.

The author explored an inguinal canal in a human being into which a whole skin graft had been sutured for a large direct bernia three months before The graft was firmly attached to Poupart's ligament the medial aponeurotic aspect of the internal oblique, and the insertion of the rectus sheath in the publs The edges of the graft could not be ascertained with certainty and the appearance closely resembled a normal inguinal canal. The dense fibrous tissue and deformity of anatomy seen in the recurrent fascial repairs were absent. The graft microscopically showed highly vascular connective tissue without dermal or epidermal elements. No hair remnants were found. Microscopically no evidence of cyst formation was seen-only a number of giant cells

The author believes that no contraindication to the use of these grafts in human beings has been found to date and he used them in a series of 110 in guinal hernias of all types 6 umbilical hernias 10 ventral, I femoral hernia and I epigastric. In this group there were a cases of mild sepsis 1 case of scrotal hematoma, and 12 cases of mild postopera tive bronchitis. Late postoperative complications have not been seen, and as yet it is too soon to study recurrency figures. The author prepares the skin (for three days) by careful shaving and washing with other soap and warm water for 10 minutes Spirit compresses and a sterile bandage are then applied. He suggests a gas-oxygen-ether or spinal anesthesia to give maximum muscle relaxation so the graft can be placed under maximum tension. The skin for the graft is encompassed on the original incision and measures about a by 1 It is prepared by remov ing the subcutaneous fat. The ends are cut off, and the graft is split for a distance of 14 inch down one end. The graft is placed in the inguinal canal, and the apex of the V is brought around the cord Three 30-day chromic sutures are used to hold the medial margin of the graft to the lower aspect of the rectus sheath, the fascia over the symphysis and the medial edge of Poupart's ligament. The graft is then sutured to the shelving edge of Poupart's liga ment and the aponeurotic medial edge of the internal oblique with sutures 14 inch apart. Care is taken that the graft be sutured under great tension. The outer pedicles of the graft are then foined laterally to the internal ring and outside of the emerging cord.

The patients are allowed up on the twentieth day since fascia does not heal firmly in less than three weeks. The same principles can be adopted for direct hernias and whole skin grafts can be used for final re-enforcements for umbilical, ventral, and ROBERT R. BROKLOW M.D. epigastric hemias

Green R. W Levenson, S. M., and Lund, C. C.: Nylon Backing for Dermatome Grafts. N Eag land J M 1945 233 268.

In the use of the drum technique of skin grafting, as described by Padgett in his book on skin grafting

(Springfield Charles C. Thomas, 1942) some sur geons have been using a backing on the drum, such as plo film (Webster) and cellophane (Evans) The author suggests a fine-gauge nylon cloth for the same purpose Before the graft is cut the drum is coated with dermatome cement and the backing is cemented to the drum as smoothly as possible. New coats of cement are then applied to the backing and to the donor site and the graft is cut as described by Padgett The graft with its back is removed from the drum and placed on the recipient site. No sutures are needed to maintain the graft at its original size and tension, it being merely maintained in place by even elastic pressure provided by a suitable pressure dressing with or without external solinting

The advantages claimed by the author for his nylon-cloth backing are (1) that nylon can be sterllized as easily as any textile and is physically unchanged after sterilization and (a) that grafts backed with aylon conform better to irregular sur faces than do those backed with cellophane, yet in spite of the relative lumpness of the nylon before it is attached to the skin it prevents contraction of the graft as well as cellophane or autures

A case history is given and 6 figures to illustrate the method and the results of treatment

IORN W. BRIDINAN, M. D.

#### ANTISEPTIC SURGERY TREATMENT OF WOUNDS AND INFECTIORS

Harkins, H. N., Cope O., Evans, E. I. Philips, R. A., and Richards, D. W., Jr.: Therapy of Burns. J Am II Atr 945 128 475.

This memorandum is released by authorization of the National Research Council and Office of Scientific Research and Development. Chemotherapy with penicillin and sulfonamides is not within the

scope of the present discussion.

Following burns, there is loss of extracellular fluid salts, and plasma. In patients with minor burns involving less than to per cent of the body surface it is generally agreed that restitution takes place by the ingestion of fluids and food, according to the desires of the patient. However in patients with severe second-degree or third-degree burns of at least one of the following areas (face and neck, dor sal or ventral surface of chest, dorsal or ventral surface of abdomen 1 upper extremity and dorsal or ventral surface of 1 lower extremity) parenteral fluid administration is necessary

Three dangerous phases are observed in severe, and inadequately treated, burns

I Shock may be present for as long as 48 hours after the burn but clinical signs may not be obvious since generalized vasoconstriction may keep the blood pressure at satisfactory levels even though cardiac output is greatly diminished Therefore, vigorous fluid therapy is essential during the first # days of every case of severe burn.

2 The period of toxemia (from 48 to 128 hours occasionally up to the third week) is manifested by fever jaundice, anurus stupor delirium and circu latory collapse

3. The third phase is defined as the period of burn

anemia and hypoproteinemia

Fluid therapy should be directed toward rapid replacement of acute deficits and the maintenance of daily needs In severe burns involving from 30 to 40 per cent of the body surface from 8 000 to 15 000 c.c. of fluid in a period of 24 hours may be necessary The dosage of plasma can be estimated by giving 100 c.c. for each point of hematocrit exceeding the nor mal of 45 (or for each 100,000 the red blood count exceeds 5,000 000) or 50 c.c. of plasma for each per cent of the body surface that is involved by a deep

Iso-osmotic human albumin solution is a satusfactory substitute for blood plasma,

In patients with hematocrit readings below 60 about 500 c.c. of blood should be given with every 1,000 c.c. of plasma.

An attempt should be made to maintain the urinary output above 100 c.c. per hour for the first 48-hour period however an initial period of anuria lasting from 4 to 5 hours is not uncommon.

If the plasma carbon dioxide is less than 55 vol umes per cent 40 c.c. of 4 per cent sodium bicar bonate intravenously or 125 c.c. of 13 per cent sodium bicarbonate or 125 c.c. of 175 per cent sodium lactate should be given for each point of carbon dioxide below 55

After a period of 48 hours excessive fluid administration should be avoided because of the danger of diculatory embarrassment and pulmonary edema. The aim then, is to maintain water and salt balance and to raise the hemoglobin to 85 per cent and the protein blood level above 6 gm. per 100 c.c. Blood transfusions and daily intravenous administration of amino acids in amounts up to from 100 to 150 gm in a 10 per cent solution, are indicated.

Oral therapy also is very important and should consist of from 3 000 to 4,000 c.c. of fluid in order to insure 1 500 c.c. of urine dally Ten grams of sodium chloride are given daily, and a diet of from 3,000 to 5,000 calories composed of from 200 to 300 gm. of proteins and if tolerated 100 to 200 gm. of amino acids along with large doses of carbohydrates vitamins and iron. ARTHUR J LEMER, M.D.

Flemming C. W The Treatment of Burns; A Pien for Simplicity Brit M J 1945 2 314. General Mitchiner's quotation, 'It can be said

truthfully that the treatment of burns has returned to chaos forms the subject of the author's article In the present state of our knowledge the treat ment of burns must be to some extent empirical, because the pathological processes which make the patient ill or cause his death are as yet not fully understood. However by careful observation of those signs and symptoms which are comprehen sible a high standard of treatment can be achieved function can be preserved and lives saved. There is bo single all-embracing universally applicable

treatment for burns and never will be. The surgeon must vary his detailed technique from case to case as in any other branch of surgery

Severely burned patients travel badly until their general condition is stabilized which usually takes

from 4 to 10 days

From the clinician a point of view burns are of two degrees slight and severe. Slight burns are those in which there is no detectable disturbance severe burns are those in which the general treatment of the patient is more urgent than the local treatment of the burn.

There are three types of local dressings available for the treatment of slight burns (1) wet dressings of saline solution or antiseptic which should be changed at intervals (2) occlusive dressings of tannic acid or dyes and (3) greasy dressings A wet dressing is suitable for a fresh burn which has not been cleansed or an old one which has become septic. An occlusive dressing is successful if the wound is clean and the burned area one that is relatively immobile It is therefore not good as a first-aid dressing, nor for the fingers face, and flexures Greasy dressings are very comfortable and proper on the face and fingers but should not be used too con tinuously as the raw surface gets grease-lodged and indolent. They are very satisfactory as the skin

In every case of severe burn there is a series of symptoms and signs which must be looked for and if found treated. The details of treatment vary but particular points should be checked over in each patient

1 Any case assessed as a severe burn, at first requires intravenous plasma. It is extremely valu able to have an estimation of the hemoglobin before treatment is started, and essential to have this determination made as soon as possible from begin ning to end the chart of the hemoglobin percentage is as important as that of the temperature and pulse. Glucose-saline solution should be given in travenously until it is apparent that the patient can drink enough, without vomiting to prevent de hydration. A fluid-intake-and-output chart gives the surgeon complete information on this point.

2 As to local treatment, despite the early appearance of organisms in a burned area there is no desperate rush to get at the wound Under mor phine alone the burned areas are cleansed with aseptic precautions blisters snipped and the wounds very carefully dressed with tulle gras or vaselined gause. The ends of the fingers are guarded by a Cramer wire splint which projects beyond the tips Morphine is given for pain.

3 It is advisable to leave the dressings un touched for 4 days at least. In the interval the patient needs fluids, glucose and rest. If his burns are reasonably comfortable he will sleep better with

a hypnotic than with morphine.

4 After from 3 to 7 days according to the general condition, it is time for the first dressing For an extensively burned patient there is nothing

seen Instead the epidermis was being desquamated and the cells and debris were being removed by

phagocytes

The author explored an inguinal canal in a buman being into which a whole skin graft had been sutured for a large direct hernia three months before. The graft was firmly attached to Poupart's ligament, the medial aponeurotic aspect of the internal oblique and the insertion of the rectus sheath in the puiss. The edges of the graft rould not be ascertained with certainty and the appearance closely resembled a normal inguinal canal. The deme fibrous tissue and deformity of anatomy seen in the recurrent fascial repairs were absent. The graft inforceopically showed highly vascular connective tissue without dermal or epidermal chements. No hair remannis were found. Microscopically no evidence of cyst formation was seen—only a number of giant cells.

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The period of toxemia (from 48 to 128 hours, occasionally up to the third week) is manifested by

ms In some of the more advanced cases a typical charge in skin coloring i e a bluish brown tinge not only of the skin around the wound but also of the face the lips and the body in general was noticed. Pulse rates were frequently above 120 and temperatures ranged from 100 to 102 F in spite of salfonamide therapy, anemia was found to be out of proportion to the estimated blood loss Wound odor best described as rotten or decaying meat or "mousey was noticed in only one third of the esses and crepitus was found only occasionally Gas gangrene occurred in the following regions in order of frequency buttocks thighs shoulders upper and lower extremities

Treatment consisted of measures against shock and anemia followed by early radical and extensive diridement Foreign bodies pieces of clothing and dirt, were carefully removed in order to prevent re connece, and all damaged muscle tissue was excised Selfonamide compounds proved of little value uninst clostridas but were very effective against other contaminants Pencillin in large doses applied locally intramuscularly and intravenously was found to be an excellent adjunct, but only if used in conjunction with surgery and antitoxin. Gas gan price antitorin was given after surgery in doses corresponding to the degree of toxemia. In the shence of sensitivity a minimum of 18 therapeutic doses were given, each containing 10,000 units of antitorin against clostridrum welchli and clostridin septicum, and 1 500 units of the antitoxin tramst clostridrum oedematiens Preoperative administration of antitoxin appeared to be of little

Eleven (11 5%) of the 96 patients died as the direct result of gas-gangrene infection.

ARTHUR J LEASER, M D

Walker Taylor P N: The Treatment of Tropical Ulcer Lancet Land., 1945 149 40.

Tropical ulcer is an acute process usually seen in West Africa. The ulcer located on the lower leg or not, is a dirty sharply marginated lesion, the base of which is covered by a dark purulent slough and the alcer is surrounded by a zone of edems. The patent with this disease is not obviously ill and

Good results were obtained by the following temple measures

t Elevation of the limb to reduce the edema and improve the circulation

2. The application of moist warm dressings The topical use of penicillin or a sulfonamide dustrut powder

4. Early akin grafting if the ulcer is large The same disease may affect the toes and is then called alcerative onychia. On a toe the ulcer devel ca under the nail or under the cuticle. It is often accessive to cut away the dead nail and the dead crists to cut away the dead nail and the dead crists. trible in order to establish drainage The drainage tench is then packed open at each dressing. Other sae the treatment of ulcerative onychia is the same

as in cases in which the ulcer is found on the leg or

Three complications are mentioned fibrosis of the ulcer bed in long-standing cases infestation with the guines worm and osteomyelitis

The average period of incapacity of the patient after admission was 37 2 days

DAVID H. LYMN M D

Archer G T L.: Bactericidal Effect of Mixtures of Ethyl Alcohol and Water Brit MJ., 1945 2 148

The author has re-studied an old but still impor tant problem and has utilized satisfactory technical methods in well controlled experiments. His findings are valuable and apparently his conclusions repre sent a significant addition to the practical information

To test the bactericidal effect of various dilutions of ethyl alcohol, 30 experiments employing 6 differ ent methods were carried out From the practical point of view this work was done to determine the optimal dilution for use on the skin When alcoholic solutions were applied to the normal or moist skin the findings differed from those obtained with the application of solutions of equal strength to dry sur faces

It was found that on a dry surface the effective range of strengths of alcohol for the killing of non sporing bacteria is between 90 per cent and 50 per cent Solutions of 95 per cent and above were found to be partially ineffective and solutions of 100 per cent, markedly so On the skin the results were dif ferent because the normal skin is more or less moist On the skin, 100 per cent alcohol was commonly found to be effective especially on moister skins and under tropical conditions of temperature and humid ity whereas under similar conditions concentra tions of 60 per cent to 65 per cent showed a certain loss of efficiency Therefore the author recommends that as a rule and under all climatic conditions 80 per cent alcohol is probably the strength most suit able for sterilization of the skin.

Ether was found to be quite ineffective as a stern lizing agent for the skin, since its effect is very slight on staphylococca and streptococca although it is effective against certain bacillary forms

DAVID H. LYKN M D

Lovell D L.: Penicillin; Its Tropical Use as a Bacteriostatic Agent for the Palliative Treat ment of Chronic Stasis Ulcers of the Lower Extremities Arch Surg 1945 51 22

The secondary infection in chronic stasis ulcers responds readily to topical applications of penicillin. This drug is thought to be superior to other bac teriostatic agents that are generally used for this purpose In the early stages of the condition rapid healing occurs when the infection and stasis are con trolled. Healing is delayed in the cases of chronic ulceration because of extensive fibrosis of the edges and the poor arternal blood supply

BENJAMIN GOLDMAN M.D.

which makes him so comfortable or the dressing so easy as a bath. In the early stages during the separation of sloughs, a daily bath seems best. Later when the wound reaches the bealing stage, it may make the granulations seems.

s Food with extra proteins is the next care
Equally important is attention to the bowels

6 The hemorlobin abouid he checked at any

time that the patient's condition causes saxiety or il progress is slow and siways on the tenth day. If it is below 80 per cent it should be checked daily and if it continues to fall a blood transfusion should be given.

y As the patient's general condition improves first-aid graiting where skin has been destroyed becomes urgent. JOHER K. NARAT M.D.

McCartan, W., and Fecitt E.: Pirst Aid for Phosphorus Burns. B ii II J 945, 316.

The facility with which copper combines with active phosphorus to form copper phosphide has been the basis of most methods of first-aid treatment of persons contaminated with phosphorus. The standard treatment suggests that the harning about nhorus should be extinguished with water and he recoing the burned area damn. The burn is treated with sourcous solutions of sodium blearbonate and conner sulfate. The principal objections to this treatment are that such solutions are combersome to carry and are not likely to be immediately available in civil defense and under active service conditions although speedy application is, of course, all-im-portant. Also the number of persons contaminated may be so large that immediate active surrical attention to all is not possible, and in the meantime it is necessary to repeat the application of the solu tion - not the best treatment for an already shocked natient. There is further the danger that repeated applications of fluid may wash particles of phosphorus to the periphery with the risk of peripheral

The danger of phosphorus-outsining incendiaries during air attacks led the author to investigate this matter with a view to producing a substance which fulfilled the following requirements (z) it should be remedies should be contained in the one compound (3) it should immediately extinguish the phosphorus and matrivate the products of phosphorus bustion, it. phosphorus pentardise and phosphorus acids (4) it should be viscous and stick to the kin so as to remain in position, and also hold the particles of phosphorus in site and (5) it should be easily removed by warm water

The authors employed uspo mollis as the base for incorporating copper sulfate, and developed a compound with a final content of 4 per cent of copper sain. The damage to tissue by burning phosphorus in thought to be due not only to the heat of combustion and to the corroller action of the phosphoric action formed as the terminal result of such combustion, but also to the intensely hygrarcopic action bestion, but also to the intensely hygrarcopic action.

f phosphorus pentoxide, which is formed in the intermediate stare of the change. Phoenhouse nentoxide "mone up water with great avidity and with the production of intense heat According to the authors when a film of water sufficient to extinguish the phosphorus flame is applied to the akin. it will not be adequate to provide the nentoride with enough water to supply its needs thus tiesee finid is called an and this produces further damage For this reason a high proportion of water is mixed with the compound. It was also believed that water loosely held in denth over the area by such a compound might act as a better conductor of heat than air and that in this way the heat generated by the change-P-O++H-O-2H-PO-would be more easily removed from the site of the inforce

A 15 per cent solution of copper sulfate in water is prepared and the requisite amount of this to give a prepared and the requisite amount of this to give a final content of a per cent copper sail. Is beated in a bolling fast. Supo mollis is heated in a water histories coulists estudion is added but by constant trimmer cultare solution in added but by constant trimmer cultare solution. It is producted to the same trimmer cach addition. It is producted to the base between each addition. It is produced to the copper sulfate solution in small successive por tions. The resulting compound is a homogenous mass and samples have kept very well for at least twelve months. The #16 of the final compound, determined electrically is 8 65 at 10°C, and 8.14 at looky temperature.

The authors conclude from results of animal reprimentation and observations on chincal material that copper salfate continent in addition to being an excellent finit-aid measure for posphorus burns is of value in the healing stages also since it has reduced the healing time of burns in striking fashion. The authors suggest that it be combined, in subsequent treatment, with sodom bicarbonstee

subsequent treatment, with sodium bicarbonate solution because the latter allows cary removal of the olutions if the burn is to be inspected, assists in the disposal of any phosphorus which may still pensist after olutionant treatment and tends to reduce the health time of the burns.

JOHNTH K. NABAT M.D

Langley F H., and Winkelstein, L. B.: Gas Gan grens. A Study of % Cases in an Evacuation Hospital. J 4m M Am 943 18 783.

Ninety-tir case of clinical gas gangrene infection were observed at an exacustion center in northern France during the period between July and December 1944. The average incidence of gazangrees infections per 1,000 battle casualities was 16. The incidence was highest in prisoners of war (6) per 1,000 battle casualities) and was considerably lower in American and Free French troups (9,9 per 1,000 and 12, per 1,000 respectively). The higher undences in the prisoners of war is explained by the longer intervals between the time of the Justical in the prisoners.

jury the first-aid dressing and the surgical repair
Early general signs of gas gangrene were ( ) pain
(1) tightness of the dressing and (1) signs of toxe

The average dose of sodium pentothal was 23 c.c. and the average dose of curare was 80 units. The duration of postoperative narcosis was minimal. all but 40 patients left the operating room either awake enough to open their eyes and respond or with an active hid reflex. MARY KARP M D

Enight R. T and Baird J W: Prolonged Anes thesia. Surgery 1945 18 33

A report is made of 1,000 consecutive operations which required anesthesia of three hours or more duration, and were collected in a period of about three years. This series has been tabulated with regard to the average age of the patients preopera tre conditions preoperative medications and assistatic agents used.

Morphine and scopolamine became the anesthe he used preoperatively in most cases although sorphine was not given in the brain cases

Spmal anesthesis has gained in popularity in the part year a long-acting single dose of the anesthetic being preferred to the continuous technique.

Cyclopropane without any addition of other was sed in the more recent group of operations but a saficient concentration of the drug was employed to produce apnea and then artificial or controlled respration was induced by manual manipulation of the breathing bag Excellent muscle relaxation was produced, and the operative and postoperative come and the recovery time of these patients were found to be better than with any preceding type of

The combination of single-dose spinal anesthesia with cyclopropane and controlled respiration gave in excellent picture with an even better postopera the course, less prostration, and more rapid recovery of vigor than was found in patients who had bem anesthetized by cyclopropane alone

Curare was added to the armamentarium in May of 1943 and it became increasingly popular as time ant by Its special advantages were the lessened hadence of catheterization and headache as com pared with spinal anesthesia.

Of 129 cases of brain surgery 102 received cyclopropane and in most of the cases an intratracheal the was inserted. All major chest surgery was accomplished under cyclopropane given intra tacheally The inflatable cuff which was used around the intratracheal tube was described and the advantages are mentioned.

discussion of cautery and fulguration in relation to the agent used was given with the conclusion that the type of anesthesis used and the benefit of the cuttry or fulguration were both too advantageous to be given up in view of the closed system of anestheir and careful draping With hundreds of train the authors have been unable to pick up an ephonive sample of gas farther than 3 inches from the wide-open end of the gas tubing

Postoperative pulmonary complications occurred blowing at of the 1,000 long surgical procedures MARY KARP M D

Baptisti A. Jr Five Years Experience with Cau dal Anesthesia in Private Obstetric Practice Am J Obst. 1945 50 180. In five years 318 obstetric cases were delivered

under caudal anesthesia by the author and seen for the routine six weeks of postpartum check up exam mation Forty five of the total represent obstetric complications such as breech presentations or transverse arrests in which procedures other than outlet forceps deliveries were done. Many of these were seen in consultation. In every case but one the anesthesia was excellent and no supplementary anes thetic was required. In one case in which the occiput was directly posterior and delivery was prolonged (arrested second stage) unliateral anesthesia only was obtained and inhalation anesthesia was necessary One cesarean section was done in this group of 45 cases but supplementary anesthesis was unnecessary Caudal anesthesia for cesarean section is hazardous because the solution must be driven higher than usual to get satisfactory anesthesia and this carries an increased risk of vascular collapse

The remaining 273 cases represent normal obstetric patients who were delivered under caudal anesthesia by means of elective outlet forceps All

had had permeotomy

This total group of 318 cases in 316 of which caudal anesthesia was entirely satisfactors, repre sents an attempt to administer caudal anesthesia in 200 cases In 2 cases the caudal canal could not be entered although it seemed clearly palpable,

In the total group of 318 cases there was no ma ternal mortality and no complication from the anesthetic, either maternal or fetal. One stillborn fetus was delivered by breech extraction after a prolonged second stage of labor the baby having died in utero before the patient was seen in consultation. One other baby died 4 days postpartum from erythroblastosis All of the other bables were born in excellent condition. Caudal anesthesia offers a tre mendous advantage in delivery of the premature infant The technique is described.

EDWARD L. CORNELL, M D

Kremer M: Meningitis after Spinal Analgesia Brit II J 1045 2 300

The possibility of introducing infection into the subarachnoid space by spinal tap has been recog nised from the time that lumbar puncture was first performed, and this possibility must be considerably increased if anything is injected into the theca. If infection is introduced along a needle track it may obviously lodge anywhere in the course of that track. With lumber puncture the possible localities are the skin, subcutaneous tissues vertebrae epidural space, and subarachnoid space

The author reports 7 cases of meningitis following spinal anesthesia and I case following diagnostic lumbar puncture. The condition is a low-grade meningitis caused by a variety of organisms introduced at the time of lumbar puncture. The main clinical features are the chronic nature of the illness

70 INTERNATIONAL ABSTRACT OF SURGERY

Penicillin. J Am H Ass 945, 139: 315. A dose of 00,000 units of penicillin given by mouth one-half hour before breakfast, regularly gave serum levels comparable with those obtained from 15,000 or so,000 units given intrammenlarly The levels obtained in the serum when the same amount of penicillin was given one-half hour after breakfast were quite varied and unpredictable

Finland M., Meeds, M., and Ory E. M.: Oral

As compared with normal persons achlorhydric individuals had more sustained serum levels from oral penicillin taken before a meal, and after the postprandial dose they had higher as well as better

sustained levels than normal persons

The serum levels obtained with ordinary penicillin in saline solution were at least as high and as well sustained as those obtained with any of the special oral preparations tested. This was true when the drug was given both before and after meals except, possibly when aluminum hydroxide gel was used in addition to the saline solution of penicillin after a meal.

Effective penicillin levels could be fairly well maintained with several oral preparations given in 00,000 or 100,000 unit doses every 2 hours

The results of preliminary clinical trials in gonor rhea and in pneumococcic pneumonia suggest that oral penicillin therapy is feasible in these conditions They also suggest that oral therapy should prove effective in other infections in which low doses of parenteral penicillin have proved adequate. Penicillin should be given parenterally to initiate therapy in all infections which are severe and in those which require prolonged treatment with parenteral doses as shown by experience. SAMUEL KAHIF M.D.

Ross, S., and McLendon P A.: Penicillin by Mouth. J Am M Art 1945, 129 3 7

Adequate therapeutic blood concentrations of penicillin, after oral administration, can be obtained when the drug is protected against inactivation by rastric acidity. A method of providing this protec tion, by the use of a double gelatin capsule hardened by formaldehyde alcohol immeraton, together with preliminary neutralization of the hydrochloric acid in the stomach, was adopted.

Administration of a 100,000 unit capsule every 3 hours, by this method, provides constant therapeu tic penicillin levels well within or above the effective antibacterial range of most susceptible organisms throughout the course of treatment.

A clinical trial of this method on to children with gonorrhea 2 with pneumona, and 2 with cellulitis

resulted in prompt recovery The relatively large doses of penicillin employed

produced no toxic manifestations.

SAMUEL KANN, M.D.

Turton, E. C. Penicillin by Intramuscular Infu alon. Brit. M J 945

The author summarizes his experience after treat ing 30 patients with continuous and intermittent intramuscular injections of penicillan. The instru ment used for the continuous intramuscular drip was the Eudrip 2 (McAdams Lance, 1944, 2 336) The intermittent injections were administered by the nursing staff after it had been instructed by medical officers.

All patients were located in a 30-bed ward and had been especially selected as having severe com-

pound fractures.

Of the 30 patients 24 were quite emphatic that they preferred the continuous intramuscular drip to the intermittent injections By 4 in whom both pectoral and thigh regions were injected the thigh was strongly preferred but the patients disliked frequent changes of the site of injection. At first the needles were changed every third or fourth day but later the tendency was to leave them in longer at the most for seven days

Fifteen patients admitted to some tenderness over the needle site but pain was not a feature of the drip in any instance. Subsequent stiffness of a limb with delayed return to full function was not found in any case nor was there any abscess formation or pus in

the needle tract.

The general impression at the end of the series was that continuous intramuscular infusion is the method of choice for the patient and no more laborrous than the intermittent injection.

LUCIAN J FROMDUTI, M.D.

#### ANESTHESIA

Brody J: The Use of Curare in Sodium Pentothal Nitrone Oxide Oxygen Anesthesis. A milenelegy 045 6 38

The author reports the use of curare in sodium pentothal nitrous oxide oxygen anesthesia for 50 consecutive surgical operations in which relaxation was excellent. The initial dose of sodium pentotbal is injected intravenously in an amount sufficient to produce parcosis to a level at which there is no response to questions. Two liters of oxygen and a liters of nitrous oxide are then administered by the semi-closed carbon dioxide technique. When the skin is incised, an initial dose of from 60 to 80 units of curare is given intravenously from a small syringe, separate from that used for the sodium pentothal. Additions of so units may be necessary when the peritoneum is opened. In operations last ing longer than from 30 to 45 minutes supplementary doses of from so to 40 units are administered to maintain relaxation and sodium pentothal is in lected intermittently to maintain anesthesis.

The curare depression can be effectively over come by the intravenous use of from I to s c.c. of a 1 2000 solution of prestigmine, plus complementary

support of inadequate respiration.

Relaxation of muscles and peritoneum has been comparable to that seen in spinal anesthesia. The preanesthetic medication was morphine sulfate and atropine sulfate given hypodermically 11/4 hours before the scheduled time of operation.

The average dose of sodium pentothal was 23 c.c. and the average dose of curare was 80 units The duration of postoperative narcosis was minimal. All but 40 patients left the operating room either artike enough to open their eyes and respond or with an active hid reflex.

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Kremer M.: Meningitis after Spinal Analgesia Brit M J 1915, 2 300

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and the tendency toward relapse. It is suggested that this is due to the formation of adhesions con taining infected cerebrospinal fluid which is liberated from time to time. These adhesions may cause apinal block or hydrocephalus

Three theories have been advanced to account for the production of this form of menuncitis

The chemical theory suggests that the condition is entirely due to the irritating action of the spinal anesthetic and that infection plays no part. There is good evidence of the irritating effects of the spinal anesthetics but it would appear that with ordinary clinical dosage this irritation comes on at once is short lived, and quiets down without relates as the urritant is disposed of

The next possibility is that the meningitis is secondary to infection elsewhere in the body. As a secondary meningitis is not possible in the clean cases one may argue that it is an unlikely ex

nianation in the others

The third possibility is that the meningitis a due to the introduction of infected material along the lum but puncture needle. It is true that in a number of cases it has not been possible to nolate the organism as might be expected in an infectious condition. The author stresses the point that failure to cultivate an organism is compatible with an infectious origin This is not infrequently seen in the meningitis which follows open wounds of the brain-an infectious condition by all other standards. The delay which usually occurs between the operation and the onset of meningitis is very suggestive of a phase of multiplication of an organism as a preliminary factor to the phase of clinical activity. Probably the most convincing evidence in favor of the infections theory is the cessation of fresh cases with the en forcement of arentic technique. There can be little doubt that the spinal apesthetics are mild irritants and it is possible that the reaction to this irritation with the outpouring of protein-rich fluid gives reasonable conditions for an organism to gain a footbold.

The only satisfactory treatment is prophylaxis It should be possible to avoid these unhappy cases completely If because of an emergency a rigid technique is not possible, then spinal anesthesis should not be used. Unfortunately the causal organism is often not susceptible to present-day chemotherapy i.e. sulfonamides and penicillin but this should not prevent an early adequate trial of these substances. The formation of adhesions causing spins! block is common and calls for no special treatment but if hydrocephalus occurs surgical relief may be necessary JOSEPH K NABAT M.D.

Stevens, E. J : Pentothal Sodium: Its Use in Con tinuous Intravenous Anesthesia and a Method of Preserving It in Solution. Asenberialer 1945 6 376

Various methods have been advocated for the administration of pentothal sodium. The author

reports his experience with the use of 0.4 to 0 1 per cent (1-150 to 1 1000) dilutions of the agent in 1 100 The o.4 per cent dilution is made by adding a gm. of pentothal sodium to a regular commercial liter bottle of 5 per cent glucose in normal saline solution. A glass drip meter is inserted into the bottle and a screw clamp is used on the tubing to regulate the flow A No 18 gauge needle is usually recommended to permit rapid injection of the solu

The diluted pentothal sodium can be kept in solution for several days thus eliminating unwar rented weste.

When anesthesia is induced with a 0.4 per cent solution, the fluid is allowed to flow in a steady stream or to drip rapidly The patient is allowed to count out loud and ordinarily will be asleep in from 45 to 75 seconds As soon as the desired depth of anesthesia is reached the rate of flow is reduced. Clotting in the needle is prevented by this method

and easy controllability is an added advantage. The o s and the o.r per cent dilutions of the pen tothal sodium are used in conjunction with local and spinal anesthetics and have special value for an apprehensive patient who wishes to be asleep. The use of these dilutions is entirely sedative and the anesthesis is dependent upon the local or spinal anesthetic agents. It has been found that these dilutions give greater relief of names and vomiting than 100 per cent oxygen when spinal anestheria is MARY KARP M.D.

McCann J C.: Anesthesia by Combined Intra venous Pentothal Sodium and Local Nerve Block \ England J M 1945 233 55

The combination of intravenous administration of pentothal sodium and regional nerve block has become the anesthesia of choice for major as well as minor surgical operations, with few exceptions at St. Vincent's Hospital, Worcester, Massachusetts. The exceptions are (1) operations in children under seven or eight years of age, because of the small caliber of the veins (2) operations about the neck in the absence of intratracheal intubation, because of the too easy stimulation of reflex laryngospasm (3) operations on patients over sixty years of age who are to undergo a prolonged operative procedure because of the unsatisfactory metabolic destruction of large doses of the drug and the danger of pulmonary edema from prolonged depression and (4) operations on patients with vomiting, asthms or abdominal distention.

During the past year the author employed pen tothal sodium intravenously as the major anesthetic in 64 per cent of approximately 800 surgical cases of all types

Frequently pentothal sodium (intravenous) as the sole anesthetic does not provide adequate muscular relaxation without the danger of respiratory depression, and surgeons have employed various com-binations. Small amounts of ether and cyclopropane quickly and completely make up for these deficiencies

of the pentothal sodium Although some surgeons mort that nitrous oxide and oxygen afford additotal help the author believes that the results are act comparable to those procured by the complemental use of regional nerve block. Only 5 to 4 per ust of his cases required ether or cyclopropane as spolemental anest hesia

la this senes pentothal sodium was administered mai per cent solution by the continuous-drip orthod, which has been well described in the liter store. In the infrequent cases in which the veins ree so small as to cause an unsatisfactory rate of for a 2 per cent solution was used After induction, the drug was administered during the period of mintenance in repeated and grouped subminumal inctions in amounts of either 5 c.c or 10 cc according to the rate of metabolic destruction of the drug m the given case Between each subminimal faction there was a wait of one minute to observe the effect on the respiratory center. The drug was even with the usual intravenous-infusion apparatus and the drops were regulated through a Murphy drip to about 250 per minute for induction and between 130 and 140 per minute for maintenance A com pamon infusion apparatus provided for continuous administration of saline or glucose solution during the intervals between the pentothal-aodium frac tons and for the instantaneous administration of phone or blood without disturbance of the patient dring the operation The intervals between frac tons were from five to fifteen minutes. Having esserved the syringe technique for several years the suther adopted this method as the simplest, most ependable and most flexible way of administering pentothal sodium

local anesthesia by means of r per cent novocain was used to take up the deficiencies of the pentothal somm. Patterns of blocking the sympathetic or atercostal nerves according to the type of operation rete mapped out from the background of general

experience with regional anesthesia

This complemental use of the two agents provided a completely satisfactors anesthesia comparable in all respects and superior in many to spinal or deep general anesthesia. It was accomplished with the administration of only moderate doses of pentothal sodium. If the two methods are effectively combined the result provides a speedy safe type of anesthesia, with an induction and recovers expemence strikingly free of unpleasant and uncomfort able episodes such as are associated with the other principal anesthetic methods. Nausea and vomiting are infrequent postoperative catheterization of male patients is rarely necessary and in cases of herniorrhaphy has practically disappeared postoperative headache does not occur the administration of parenteral fluid except as required by the technical exigencies of the operation is reduced almost to the vanishing point and early ambulation is favored

The author believes the combination of intra venous administration of pentothal sodium and anterior solanchnic block constitutes an ideal anesthetic for all operations on the stomach spleen gall bladder and ducts. The combination has been par ticularly popular on the European continent, and no anesthetic fatalities had been reported up to 1937 In the author's cases the use of anterior splanchnic block resulted in a reduction of about 1 gm, in the average total dosage of pentothal sodium required

The purpose of anterior splanchnic block is to deposit an anesthetizing dose of novocain retroperi toneally at the level of the first and second lumbar vertebras between the north and the inferior vens cava. This is an isthmic point or meeting place for all sympathetic nerves and plexuses deriving from the greater and lesser splanchnic nerves and the sympathetic trunks which supply the stomach duodenum pancress and transverse colon

The author presents a modified technique that he devised for carrying the splanchnic needle to assured and safe contact with the first lumbar ver DODGLAS R. MORTON M.D. tebra

# PHYSICOCHEMICAL METHODS IN SURGERY

#### ROENTGENOLOGY

Peake, J D: Radiation Therapy in Uterine FI broids Sends. If J 1945 38 480

The author reports on soo cases of uterine fibrolds treated by radiation therapy and followed up from six months to ten years All the patients had symptoms usually abnormal uterino bleeding and especially menorrhagia. Their average age was forty two years and the ages ranged from twenty six to seventy-seven years. The diagnosis was based on the history and pelvic examination by at least two physicians some patients received preliminary diagnostic curettage. Patients with com-plicated pelvic conditions those in whom the diagnosis was doubtful and those with very large tumors were not treated by this method but were referred for surgery. On the other hand for pa tients with some concurrent illness contraindicating surgers such as coronary heart disease, radiation was considered the treatment of choice for fibrolds with bleeding

Roentgen therapy slone was given to 186 of the patients, with from 250 to 300 roentgers measured in air given daily through one of the two or three pelvic portals 15 cm in diameter until from 6 to 12 treatments had been given within two weeks. The factors were 200 kr.p., 20 ma., 30 cm. distance a filter of 6 mm. of aluminum plus 0.5 mm. of copper of high value layer 0.9. The larger dones proved

the more successful.

Eighty-six cases had only radium, inserted after dilatation and curetrage from 35 to 50 mgm, with r mm. of platinum filter being left in the uterine cavity until a total done of from 800 to 3,000 mgm. his was reached. In addition, 18 cases which had not responded well to a course of roentgen therapy were given radium in smaller doses

In all but a cases bleeding stopped in from six weeks to three months. No menopasual symptoms occurred before the third month, but thereafter two-thirds of the patients developed hot flashes increased nervounness or headache. Treatment comsted of barbiturnite estrogens, and resisaurance. In a cases bleeding recurred after the use of stilbestrol, and in r. case after theelin, but it stopped when the drug was discontinued. No patient gave a history of loss of libbid following it radiation and no pregnancies occurred, but several of the younger patients eventually re-establashed a normal mensitual cycle.

The author concludes that uterine fibroids re-

The author concides that utering motion to spond well to irradiation therapy as Jadicated by the arrest of bleeding and reduction in size of the tumor that complications are slight, and that irradiation is the method of choice for patients with concurrent disease rendering surgery cangerous

LILLIAN DONALDSON M.D.

#### MISCRIJANEOUS

Hoster H.A., and Doan, C.A.: Studies in Hodgkin's Syndrome The Therapeutic Use of Radioac tive Phosphorus. J. Leb. Clin. II 1945, 30 6y8.

The authors report the freatment of 11 patients with histologically proved Hodgkin's disease by his weekly intravenous, and occasionally one administrations of radioactive phosphorus (P<sup>a</sup>). The single doese ranged from 1 re to 3 or mc. of intravenous equivalent. Therapy was discontinued as soon as an increase in the activity of the disease or bone in volvement, became evident and this occurred in to other patients. (One patient died during treatment and another patient failed to return for further treatment). The maximum and minimum periods during which treatment occurred, before additional evidence of disease activity developed were thirty seven weeks and ten weeks, respectively

The conclusion was reached that radoactive phophorus was not of therapertic value and that succasiful subsequent x ray treatments in 8 of the patients indicated the superiority of the latter method. The treatments affected the blood in a similar manner as did treatments with roentgen rays e.g., all cases showed a drop in the leucocyte count. Of interest was the intense depression of the platfett count in y of the cases, which persisted even after the administration of P<sup>20</sup> had been discontinued. No clinical evidence of benerothera occurred:

The authors discuss briefly the preparation of the radicactive phosphorus isotope (1<sup>th</sup>) by bombardment of regular phosphorus with a ten million volt deuteron beam in the Ohlo State University cycloron.

GERRAND S. SERWARL M.D.

Clarkson, J.R., Bosg, J.W., Holmes, B., and Ellis, F: Symposium: Physical Blochemical, and Therapeutic Aspects of Volume Dose. Bril J Radiol. 945 18 233, 35 38, 240.

In 1915, it occurred to Ellis that a certain advantage may be derived from a knowledge of the total quantity of energy of radiation absorbed by the body during the course of treatment. This be called the 'volume dose." In 1910 Mayrecord carried out a series of experimental investigations to determine the magnitude of this dose. As a basic unit be suggested the gram-roentgem, which is the energy conversion when 1 roentgen is delivered to 1 gm, of air and is approximately equal to 5 gergs. A meggram-roentgem (one million gram-roentgems) is approximately equal-valent to a solor-valent or such as the contract of the co

In the present symposium Clarkson discusses the physical aspects of the volume dose. He pays attention to the value of the dose (1) during whole-body irradiation, and (2) during limited field irradiation.

A wax model patient of elliptical cross-section, and divided into slabs has been constructed (in confunction with Mayneord) By placing condenser ionization chambers in some of these slabs and by making use of a focal skin distance of 250 cm. so that the entire body is irradiated at one time meas grements have been made for various situations The volume dose was then calculated from the doses recorded by the ionization chambers. It was found that for equal surface doses the volume dose varied greatly with the quality of the radiation. This is important in devising protection regulations against stray radiation. It appears that a person working in a "deep therapy department may absorb five times as much energy for an equal measured stray radia tion dose as one engaged in diagnostic work.

2 No systematic measurements were carried out with the limited fields of irradiation. One condition studied, however led to two interesting results (a) it was found that a large proportion of the energy absorption (about 30 per cent in the particular case) occurred in parts of the body receiving less than 10 per cent of the dose at the center of the field on the surface and (b) it was also found that if a limiting disphragm of 3 a mm thickness of lead was used (with roentgen ravs of 3 7 mm copper half value layer) the total energy absorption was almost so per cent greater than when one of 11 mm, thickness was used which means that the common limiting diaphragms are not thick enough.

Mayneord recently supplied graphs and tables which make it possible to calculate the volume dose for various methods used in roentgen and radium therapy In radium therapy the volume dose is expressed in gram-roentgens per milligram hour

Bong discusses the energy absorbed by a patient during x ray treatment. He gives physical data which are complementary to those of Clarkson, in that they refer entirely to limited fields. They have been obtained from measurements carried out (in conjunction with Walter) on the celluloid model patient devised by Grimmett (1939 1942) for this purpose. This model is constructed of graphited cellulose acetate plates, 6 mm. thick, spaced apart by 2 mm thick washers of the same material. The graphite makes the plates electrically conductive Alternate plates are connected together and the two groups of plates thus formed are connected to opposite poles of a battery A sensitive galvanometer included in the circuit measures the total ionization current collected from all the air gaps where these are in a radiation field Certain requirements must be fulfilled if the measurements made with such a model are to give a true picture of the energy absorption in the human body. These are briefly described.

The following situations have been studied field on pelvis, field on chest short focal skin distance, head fields dependence on half value layer mass of fields effect of size of the patient and the distribu tion of absorption in different parts of the body The investigations were carried out with roentgen rays of 2 to 4 mm, copper, half value layer and the curves to obtained plotted. The conclusion was that the volume dose depends upon the area and site of the field and to a much smaller extent upon focal skin distance linear dimensions of the patient and half value laver of raduation

Holmes discusses the biochemical aspects of volume dose. The author states that none of her obser vations were made with consideration of the volume dose but that in few cases enough data are avail able to allow of calculation.

It is not possible to draw positive conclusions al though there remain some clear suggestions for future work.

It is inevitable that investigations of general brochemical effects should be related to x ray sickness A great deal of work has been done on this Among the various phases studied are acidosis alkalosis changes in the calcium, sodium and potassium con centrations of blood tissues and urine changes in the blood cholesterol liberation of histamine the role of cortical hormone and, more recently the responsibility of purines It is interesting in connec tion with the purines that uncacid the end product of purme metabolism is found in increasing amounts in animal tumor cells twenty four hours after irradia

Ellis discusses the clinical aspect of the volume dose in radiotheram. He calls attention to the fact that the term mega gram roentgen because it assumes unit density of the patient might be better replaced by a volume unit. However no such neat term is available since the analogous 'volume term would have to be mega cubic centimeter

Unlike Mayneord's wax patient and Grimmett's celluloid patient human beings are complex physicochemical factories subject to mental and a multitude of other influences Because of this biological phe nomena are difficult to correlate with volume dosage,

The relationship of volume dose and tumor dose can be changed by varying (1) the field size (2) the focus-skin distance (3) the quality of the beam and (4) the arrangement of the number of fields

I The effect of field size The volume dose is calculated by the formula

max, r/min. possible D x A x r/min. for field size considered

where D is read from a graph (of Happey) and A= area. It results from this formula that other things being equal the volume dote is almost proportional to the field area For example if the field is 400 cm 1 and the beam passes through 20 cm. of tissue, the volume dose is 13 x 400 x || x dose and for a field of 50 cm 2 it is 13 x 50 x || x dose. The ratio of the volume doses therefore is W x 1 21 for the same surface dose. For the same depth dose the ratio becomes more nearly equal to that of the areas A circular field of 10 cm. in diameter will give a less volume dose than a square field of 10 cm side

2 The effect of the focus-skin distance things being equal the greater the focus-kin di-tance the smaller the volume dose and thus the lethe untoward general reaction

3 The effect of the quality of the beam This ha been demonstrated by I hillips when he treated car casoms of the rectum with 6 oos recatgess by using in one case soo ky and in the other 1,000 ky. The volume dose was much greater with the high voltage beam for the same surface dose other things being equal

The arrangement and number of fields. Ligar in 1933 analyzed the factors in this respect. He gives examples of arrangements of fields for carcanoma of the cervix in relation to "economy quotient and volume dose. The economy quotient is defined as the ratio of the minimum tumor dose divided by the difference between the maximum and minimum tumor doses. It was found that other things being equal the arrangement which gave the greater economy courtent gave the smaller reduced dose.

In correlating the biological phenomena with the volume dose, special attention must be paid to the general or constitutional as distinct from local phenomena. They may be divided into subjective and objective. The former include malaise names vonting, headache etc., which it is impossible to measure or dissociate from the effects of local phenomena. The latter are dividible into two classes (1) blood counts and (2) other measurements

1 Bush, in 1943 published a curve correlating the volume dose with the proportional decrease in lymphocrtic count relative to the initial count. The author himself found so such reliability and his experience with other features of the blood count were complete negativities.

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2 Other measurable quantities are the corpuscu
har volume color index, sedimentation test and
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Camp J D., and Moreton, R. D.; Radiation Necroels of the Calvarium; Report of 5 Cases. Radielegy 1945, 45, 13

The authors found 3 cases of radiation necrosis of the clusterism in a series of 2,036 cases of instructions are causal tumors which were treated by roentgen rays and with or without surgical measures at the Maro Claine. However since no systematic follow-up roentgenograms were available in all cases it is probable that the Incidence was higher

The yourse are presented in detail and illustrated with their respective roentgenograms. In the first case, the radiation necrosis was discovered five versus after the roentgen therapy in the second case 1 years later in the third case 12 years later in the footb case 14 years later and in the fifth case 17 years later.

In mose of these patients was there are synchrome referable to the pectorist of the bose Because of this and amore the calvariam does not function as a structure of attess the authors believe that so attempt should be made to reduce the recentgen down which is necessary to destroy the intracrallal tunor for which the treatment is originally undertaken. The long survival obtained in the cited cases well justifies the soundness of the technique of irradia tion employed.

The knowledge of the possibility of necrosis of the calvarium following intensive roentgen irradiation of the skull is important for the reason that it may obvaste confusion in the diagnosis with other similar conditions.

Thereonia, M.D.

# MISCELLANEOUS

## CLINICAL ENTITIES-GENERAL PHYSIO-LOGICAL CONDITIONS

Outer S. J : Serum Amylase Findings in Chronic Alcoholic Patients with Acute Severe Abdom inal Symptoms. Ann Surg 1945 122 117

The purpose of this article is to emphasize the againstance of the high serum amy lase values found is a group of 11 patients suffering from acute abdominal symptoms in whom there was a history of dirence alcoholism. The symptoms and signs upon admission of these patients were vomiting severe epositic pain and marked upper abdominal rigid ar with or without epigastric tenderness. In this type of patient, the diagnosis of acute alcoholic gastrits is usually made while occasionally an un recessry exploratory laparotomy is done for a pos sible surgical lesion. The preceding alcoholic debanch evidently precipitates changes in a digestive system that has been impaired by the prolonged ex

Four of the 11 patients in this series were subected to operation and in each instance edema about the pancreas was noted. The pentoneal fluid was of a thin sanguineous character. In the remain as 7 patients the high amy lase levels were the chief actor in deciding against operative intervention

These 7 patients were discharged well

The cause of the elevated serum amylase is con sidered to be the rapid destruction of the acunar nembranes of the pencreas and the sudden escape of the enzyme into the blood stream Evidence con orning relationships between the ingestion of large amounts of alcohol chronic alcoholic gastritis and pathological changes in the pancreas is discussed JOHN L. LINDQUIST, M.D.

litribut, P. A., and Scaricaciottoli T. M. Diffuse Hepatic Necrosis Caused by Sulfadiazine Arch

Petk, Chic. 1945 40 94

A renew of the literature discloses reports on 4 cases of acute diffuse hepatic necrosis resulting from theuse of sulfanilamide. To these the authors added one of the condition following the administration of miliadiazine. One patient had not previously recayed sulfonamide compounds whereas the other and been given a course of treatment with sulfadia one month before a second course was adminis-

It is thought that while focal hepatic necrosis may realt from outright chemical action of the sulfona ake compounds on the liver cells diffuse hepatic across may be the result of inherent or acquired hypersensitivity of the liver for the drug

Of the two types of renal damage ascribed to the the compounds the authors believe that the the type wherein crystals or concretions are found is and beyond the renal tubules is due to the direct

action of the sulfonamide compounds on the kidney The more severe type, however showing tubular necrosis casts and interstitial congestion and edema with foci of inflammatory cells is due, they believe to the accompanying disease process which may be infection, intestinal obstruction, jaundice, or some other condition, and not to direct action of the drug on the renal parenchyma. EARL O LATIMER, M D

Rostenberg A., Jr., and Welch H: A Study of the Types of Hypersensitivity Induced by Penicil lin. Am J M Sc 1945 210 158

The authors state that a study was made to deter mine the incidence of hypersensitivity of the tuber culin type to crystalline penicillin sodrum in individuals who had had no previous contact with this drug Studies were made also of the sensitivity induced by the injection of commercial or crystalline penicillin sodium The procedure which was followed is given

To determine the incidence of the tuberculin type of sensitivity to penicillin 644 persons were tested. Each person was injected intradermally on the volar surface of the forearm with o 1 c.c. of penic illin sodium containing 1 000 units. When a posi tive reaction resulted a retest was made with crystalline penkullin. Eight individuals exhibited hypersensitivity of the tuberculin type when tested initially Attempts to show a passive transfer of the hypersensitivity with use of the Prausnits-Kustner technique and the Urbach-Koenigstein method both

The authors state that it has been previously noted that following intradermal injections of com mercial penicillin in man there developed a flaring phenomenon in certain persons which appeared only after a variable number of injections had been made This phenomenon consisted of an increase in reducts and itching at the sites of former injections following the intradermal injection of crystalline penicilin sodrum in the new site Persons who exhibited this type of reaction failed to do so after a rest period during which no injections were made. The authors injected 9 individuals intradermally with 10 000 units of commercial penicillin sodium, 1 000 units in o 5 c.c. of saline solution at each of 10 different sites These injections were repeated in approximately the same areas five and ten days later a total of thirty injections being given Following the first series of to injections some of the subjects showed evidence of chemical irritation all who showed the irritation developed it from the same lots of penicillin. Fol lowing the second series of 10 injections reactions occurred in a people One individual who had previously received injections showed the flaring phenomenon described, at the site of the old injections another developed urticaria thirty hours after injection. Two days after the reaction had subsided

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an attempt was made to transfer the sensitivity of the latter to 3 normal individuals by the Prusuitz Kustner technique. Passive transfer was not suc cessful. In the third series of 10 injections the reaction varied considerably. Four subjects showed erythema around all injected sites within from fif teen to thirty minutes. Wheals, varying in size from 5 to 15 mm, developed in 2 of these individuals and subsided within a period of from one to two hours. The other 4 test subjects showed, in addition to whealing and marked crythems at the sites of injection, the fairing reaction at the old sites of inject. One of the group of 4 exhibited the most in tense reactions.

The authors attempted to induce sensitivity by varying the technique of administration. Only 1 person developed an increase in sensitivity and this individual was one of those who had been injected intradermally with crystalline penicillin sodium. Because of the reactions shown, a series of patch tests was made to determine whether the eczema tous type of hypersensitivity could be demonstrated. The tests were made with commercial penicillin sodium. Although all patch tests were negative intra dermal tests made at the same time with crystalline penicillin sodium again revealed a positive tuberculin type of sensitivity to crystalline penicillin sodium and also gave a positive reaction at the site of a previous intradermal injection of either commercial or crystalline material.

After the akin of 5 other people was sand-papered sufficiently to cause a faint pin-point punctum of blood, patch tests were made. These were negative, and indicated that the negative patch tests resulted from the lack of a hypersemitive shock tissue rather than from inability of penicilla to penetrate the horry layer.

An attempt was made therefore to transfer passively the hypersensitivity exhibited by individuals in whom the hypersensitive state had been induced by intradermal injection. Passive transfer antibodies could not be demonstrated. Precipitin tests made on the serum of the 4 test subjects were also negative.

To determine whether the sentitrity to penicillin would also extend to the spower of penicillin notation, a best killed surpension was made containing socoor spores per cubic continueter. Intradermal injections of o I c. c. were given to 5 persons who calibited a tuberculin type of hypersensitivity to penicillin. There were no immediate or delayed reactions.

In conclusion, the authors state that 5 per cent of 144 individuals tested with crystalline penicillins odium exhibited a positive reaction of the tuberculin type despite the fact that none of these individuals had any prior contact with penicillin. Repeated multiple intradermal injections of penicillin sodium cunced the development in some people, of reactions of the Arthus type, and some of these also developed a tuberculin type of hypersensitivity.

Since the material at test strength is not a primary irritant a positive reaction indicates that these indeviduals are specifically hyperaemiture to this material. It is assumed that these individuals have during the contact with penicillin sodium or with an immunologically equivalent material. Contact with penicillin sodium as such can be arbitrarily eluminated. However contact with penicillin appears to be quite likely since it is a furily common genus of tangi. It may be ingested or inhaled and, in stategratic life individuals produces a subclinical infection with a consequent alteration in their immunological exposures. Hassars ? Trustrox,M.D.

Hines, L. E., and Kessler D L.: The Effect of Penicillin on Heparin Tolerance. J Am M Ast 945, 1 5 794.

Studies of the effect of pentelllin on heparin toler ance were carried out following the occurrence of extensive visceral hemorrhages in a patients with bacterial endocarditis who were treated by pentellin.

The first case was that of a female 37 years of age. Serial blood cultures showed hemolytic streptococci. During the period between May 27 and June & 1014 this patient had received 700,000 units of penicillia intramuscularly Two days following the first injection her temperature was found to be normal and spectacular symptomatic improvement was shown. However in as days following her admission to the hospital she suddenly developed generalized tonic and cloude convulsions which lasted for a period of s hours she became comatose and died a days later At autopsy the anatomic findings were extensive spontaneous subarachnold hemorrhage of the base of the brain secondary to a large hemorrhage of the pons, almost healed endocarditis to the mitral valve (hemolytic streptococci, clinical) small recent in farct of the left lung ancient infarct of the spicen and cystitis of the urinary bladder

The second case was that of a female as years of age who had been presment for a period of a months. Serial blood cultures were negative after at days and the patient delivered a viable baby in the seventh month of pregnancy During the next 11 days t 200,000 units of penicillin were given intramusca larly and in addition, 1 100 mgm, of heparin were given during the first 5 days. The patient's temper ature gradually subsided to normal after a period of 7 days. Death occurred 13 days following delivery At autorsy the anatomic findings were as follows vegetative and ulcerative endocarditis of the aortic and tricuspid valves with erosion and perforation of both valves acute perforated ulcer of the stomach with extensive hemorrhage into both the lesser and greater peritoneal cavities extensive petechial hemorrhages of the peritoneum, pericardium, pleurae and seroes of the small intestine and other minor findings. The greater peritoneal cavity contained air and more than I liter of partially clotted blood.

The 2 patients presented the following points of similarity proved bacterial endocarditis early im provement by penicillin therapy and fatal termination from hemorrhage 1 by extensive cerebral hemorbage; the other by widespread, intrapertioneal mesenteric and pleural hemorrhages. One patient received heparin while the other did not.

Studies were made on the effect of penicillin on the clotting mechanism, and particularly the effect of penicillin on the reaction of the blood to heparin.

penicilin on the reaction of the blood to heparin. Other studies were made on a series of patients before penicillin was administered, during the course of therapy and after the penicilin had been discontinued. These studies included crythrocyte counts bemoglobin determinations prothrombin time, platelet counts and heparin tolerance curves. In each case the penicillin was administered intramuscularly in doses of 10,000 Oxford units every 3 hours One-hall of the patients studied had diseases which were considered unsuitable for penicillin therapy and therefore served as controls.

Although in the 10 cases studied there were no significant changes in the erythrocyte count hemoglobla, platelet count or prothrombin time, a definite change was produced in some patients in the heparin tolerance curve In 2 patients very profound effects were registered in their sensitivity to heparin. There was no effect on the tolerance curve in 3 patients there was a slight but inconclusive increase in 5 miterits.

patients

These studies suggest that it is advisable to run heparin tolerance sensitivity tests as a precautionary measure if heparin and penicillin are to be used at the same time. RUMAND J BENERT, JE, M.D.

Marriott H L. Medical Problems of the South East Asia Command. Lond Lond. 1945 248

The buggest single lesson learned from the expenince of the last three vers has been the tremendous importance of disease in washing manpower. No figures of value are available for 1942 in 1934 to 1934 to 1934 in 1934 to 1

At least four fifths of the sickness casualitie have been due to diseases which may be classified as preventable. This being the case it would seem rational to employ a very much higher percentage of personnel in the business of prevention. Any men given to the hygone units by the hospitals and other curative units do not represent a loss to the last two units because the diminished incidence of disease will result in much less work for them. One medical officer engaged in hygene can save the work of so medical officers in hospitals.

After disease prevention the most important function of the medical services as the rapid cure and return to duty of all sick and wounded. In this respect the value of diagnosus and treatment at the earliest possible moment cannot be overstated. The

diseases particularly malaria diarrhea the dysenteries and skin diseases have in common that their response to treatment is proportional to the speed with which it is applied. What is done at once matters much more than what may be done several days later.

A compressed review such as this does not lend itself to summarizing. The author hopes that its brevity relative to the extent of its aubject may excuse a tendency to dogmatum and perhaps to oversimplification. Jonn E. Kirzhatzucz, M.D.

Welch C. S., and Tuhy J E.: Combined Injuries of the Thorax and Abdomen. Ann Surg 1945 122 358.

Welch and Tuby discuss their experiences in the definitive treatment of 83 patients with combined injuries of the thorax and abdomen treated in an evacuation hospital. There were 4 principal types Thoracoaddominal wounds those in which a mu-

sile enters the pleared cavity first traverses the daphragm and lodges in or traverses the peritoneal cavity. These made up the largest group (53 cases). Abdominotheracic wounds those with primary

Abdominoshorate wounds those with primary involvement of the abdomen followed by perioration of the diaphragm and injury to the thoracic cavity. The 13 cases in this group were placed in a separate category because of the somewhat different problems and prognoses which they presented.

Theracordroperitoreal wounds' those involving the diaphragm and retroperitoreal structures (commonly the kidney) without apparent involvement of the peritoneal cavity. The 6 cases under this head mag are grouped together as the order in which these structures were injured seemed to make hitle difference in the outcome.

There and abdominal injuries these include (y) apparate mustile wounts of both cavitier y cases (s) a subcutaneous injury to the chest and abdomen by blunt traums 2 cases and (s) mustile wounds of one body cavity associated with blunt injury to organs of the other z cases with penetrating chest wounds associated with contuision of the kidney in z instance and of the spleen in the other belong in the last category.

The wounds were on the right side in 48 cases with 8 deaths and on the left side in 32 cases with 12 deaths. Both patients in whom the chest was involved on one side and the abdomen on the other died. The operability rate was 88 per cent. Hall of the patients had associated injuries

Five principal types of operation were carried out (1) thoracotomy and transdiaphragmatic operation (2) thoracotomy and transdiaphragmatic operation combined with cellotomy (3) cellotomy alone (4) repair of the kidney and (5) wound exploration with suture of the pleura if necessary

Five of the 10 patients with injury on the right side and 7 of the 30 with injury on the left side all of which were operated upon died during the period of observation. The operative mortality rate was 17 per cent.

Snyder II. E.: The Management of Intrathoracic and Thoracoabdominal Wounds in the Combat Zone. Ann Surg 1945 22 333

Snyder thinks that few casualties with wounds of the chest who survive to be evacuated from the battle field would die if properly equipped trained surgeons were available for their care and first priority management, consisting of prompt care and surgery in the most forward hospital installations were provided.

A surgeon familiar with both thoracic and abdominal surgery is best qualified to treat severe wounds of the chest which are encountered in the most for ward hospitals and an anesthetist well trained in endotracheal anesthesia for thoracic surgery is essential Oxygen-ether administered endotracheally through a closed apparatus capable of positive pressure is the preferred anesthetic in all perforating and penetrating wounds of the chest whereas prompt well-directed resuscitative measures, plus thoracotomy are required for the recovery of patients with thors coabdominal wounds with continuing intra thoracic hemorrhage and large bronchial fistules

The preferred management of open chest wounds consists in the proper occlusion with gause and adheave strapping until the patient is in a hospital equipped and staffed to do intrathoracic surgery

Early and repeated aspiration of hemothoraces without air replacement, is recommended, and hemorrhage has not recurred because of this practice. Moreover it is believed that early aspiration of large pneumotheraces and continuous aspiration by catheter water-seal drainage of pressure poeu mothoraces must be accomplished to secure a high annival rate in such conditions.

Intercostal nerve block, to relieve pain, to promote deeper breathing, and to facilitate expulsion through the coughing up of blood and mucus in the tracheobronchial tree, is an important adjunct to therapy whereas tracheal catheter suction has an important place in the pre- and postoperative man agement of chest wounds.

At the termination of every operation upon a patient with a chest wound, a bronchoscopic aspi ration of blood and mucus from the traches, main stem bronchi and lober bronchi should be done It may be indicated in the preoperative, operative and postoperative periods when less radical measures fail to clear the tracheobronchial tree

Replacement therapy particularly with whole blood, is most important, and autotransfusion of pieural blood should be used whenever practicable. Care must be exercised to give the blood slowly after the systolic blood pressure has reached so mm. Hg. and to give no more blood than is necessary to attain adequate resuscitation.

Most wounds of the chest need only débridement of the chest wall, preceded and followed by proper chest management replacement therapy and oxy gen therapy There are certain indications for thoracotomy through the wound, and fewer indications for formal thoracotomy by separate incision.

Surgery of chest wounds with few exceptions should be done first in the case of multiple wounds, thoracoabdominal wounds and combined intra thoracic and abdominal wounds. Most thoracoabdominal wounds are best handled first by the thoracic approach a celiotomy being performed only if abdominal wounds cannot be cared for by the transdiaphragmatic route.

Evacuation from the picura of blood, air and all foreign bodies and irrigation of the pleurs with physiological salt solution is desirable in the surgery of perforating and penetrating wounds of the chest. On the other hand, complete expansion of the lung by its inflation to the chest wall and evacuation of all pleural fluid and air should be effected at the end of all operations in which the pleurs is opened,

Sulforamide or penicillin therapy should be con tinued until the pleura is free of all air and fluid STEPHEN A. ZHEMAN M.D.

#### GENERAL BACTERIAL, PROTOZOAN AND PARASITIC INVECTIONS

Saphir WiFileriasis. J Am M Ast 1945 at 114

The value of the old dictum that a diagnosis of infectious duesse should not be made in the absence of the demonstration of the causative organism, is undisputed vet, if this dictum were adhered to the early diagnoses of filariases could not be made in most cases A delayed diagnosis until such a time as microfibariae become demonstrable might prevent the only effective procedure, namely early removal of the patient from the endemic area. Furthermore it would create a large reservoir of carriers on whom the mosquitoes could feed, and thus cause widespread propagation of the disease.

It is for this reason that a syndrome such as has been outlined must be depended upon, in order to

reach at least a tentative diagnosis

There seems little doubt that the clinical picture as described in the original article was due to filarial infection. It is true that the findings were not as typical as were those described in the textbooks nor were there typical filarial attacks accompanied by constitutional symptoms such as fever general ma laise and prostration. On the other hand, there was a history of exposure to day and night biting mos quitoes in an area where the native population was known to be heavily infected with filariass. There was a more or less generalized lymphadenopathy and various types of genital lesions were present. Periodic aggravations of palms and swellings to characteratic of the later stages of the disease were commonly observed However the asymptomatic stage also peculiar to late cases was not noted in this series. Nocturnal pains and particularly noc turnal orchiodynia, were frequent complaints.

Laboratory tests as performed were of little diag nestic help, with the possible exception of the test for cosmophilia which was present in 40 per cent of the cases. The diagnosis must be based on clinical DOUBLAS R. MORTON, M.D. evidence.

Weich H. Price, C. W and Chandler V L.: Oral Penicillin. J 4m M Ass 1045 128 845

The successful oral administration of penicillin may depend upon complete neutralization of the acidity of the stomach plus a relatively slow release of the drug from some chemical which adsorbs it readily. Thirty cubic centimeters of aluminum by droxide gel (USP) were added to 100 000 units of penicillin dissolved in water 20 c.c. of magnesiae magma (USP) were added with constant agitation to 100,000 units of penicillin desolved in water The penicillin and metallic hydroxides were centrifuged at high speed, and it was found that approximately so per cent of the penicillin which had been added to the aluminum hydroxide remained adsorbed on the sediment. In the case of magnesium hydroxide approximately 25 per cent of the penicilin remained adsorbed on the sediment. The metallic hydroxide sediments were washed several times with distilled water Approximately so per cent of the original amount adsorbed still remained. It appears that penicilin adsorbs more readily by aluminum hydrox ide than by magnesium hydroxide but that magnesium hydroxide is more retentive

Oral administration of penicillin treated with aluminum hydroxide was carried out. These tests were carried out with the use of 100 000 units of pent cillin sodium in 20 c.c. of water and 30 c c of alumi mm hydroxide (U S.P.) Bloods were taken at stated intervals following ingestion. Control tests were carried out with the use of 100 000 units of untreated penicillin sodium. With the aluminum hy droxide, about 50 per cent of the blood samples at twenty four hours showed a concentration of peni dllin equivalent to from o on to o our unit per cubic centimeter of serum. In the control test with the un treated penicillin sodium, no penicillin could be demonstrated in the blood samples collected at the

seventh and the twenty fourth hour

Other tests were carried out whereby instead of giving one initial large dose the same amount of penicilim was given in four full and equal doses of 25,000 units each at two-hour intervals. With this method the concentration of penicillin in the blood did not drop below approximately o o8 units per cubic centimeter until after the eighth hour From the eighth until the twelfth hours a concentration of 0.06 units or more per cubic centimeter was main tained. Between the twelith and the fifteenth hours the concentration dropped to 0 036 unit per cubic centimeter and this level was maintained through the twenty-eighth hour

By contrast 6 persons given 100 000 units of un treated penicillin sodium in 25 000 unit doses every two hours had an assayable level for from seven to eleven hours With the use of magnesium hydroxide in similar tests the results were similar to those obtained with penicillin modified with aluminum by droxide. The amount of magnesium hydroxide used caused some laxative effect in 60 per cent of the persons using it. Magnesium hydroxide neverthe was as effective as aluminum hydroxide in the maintenance of penicillin in the blood after adminis tration 7 2 per cent of penicillin was excreted in the urine over a period of twenty four hours. After these metallic hydroxides and penicillin have been pre pared and kept at refrigerator temperature both mixtures have been found to be stable for a period of at least thirty days The strong neutralizing effect of aluminum hy droxide on the acid of the stomach is established.

There are indications which suggest that perhaps there is some absorption of penicillin directly from the stomach into the blood stream, and there is also some indication of an accumulative effect. When this penicillin aluminum hydroxide was given in fractional doses, the serial concentrations of peni cillin did not fall below an effective therapeutic level until after the twenty fourth hour and this is ease cially significant when it is considered that the peni cillin aluminum hydroxide was not given until after the sixth hour RICHARD I BECOURT IN. M D

#### DUCTLESS GLANDS

Anderson T and Trier M Alternating Hyper thyroidism and Myzedema. Acts well scand 1044, 110 345

A case of alternating hyperthyroidism and myx edema in a woman who was 41 years of age on her first admission to the hospital in August 1935 is described. At this time she showed pronounced symptoms of exophthalmic goiter although her met abolism was normal. She was given iodine treat ment and her metabolism fell to pathologically low values accompanied by the development of well marked symptoms of hypothyroldism From that time up until March, 1941 she had 3 alternating periods of hypothyroidism and hyperthyroidism, de creased thyroid function developing when she was given jodine and increased function on thyrold med ication. As the alternating changes in her condition became unbearable to the patient subtotal thy roidectomy was performed on March 12 1041 after she had been given preoperative rodine treatment After the operation she had hypothyroldism for the fourth time and was treated with thyroid gland tablets. After a transitory overdosage which resulted in symptoms of hyperthyroidism the thyroid treat ment was discontinued in June 1943 and the patient has had no treatment since In April 1944 her metabolism was still normal

Apparently the normal condition of this patient was one of hypothyroidism in the course of which she developed a pathological condition of hyperthy

roidism or dysthyroidism

Zondek reported a similar case in 1943 in connec tion with which he held that conditions of hypofunction and hyperfunction of the thryoid gland must be caused by neurogenic or humoral factors outside of the gland and that the transition from exophthalmic goiter to myxedema is not due to temporary functional exhaustion of the thyroid

AUDREY G MORGAN M D

82 INTERNATIONAL AB Muether R. O., Sexton, D. L., Macdonald, W. and Yon Bruesgen, J. Tr. Clinical Experiences with Thiouracil. South. M. J., 1945, 38 443.

The authors present a review of the history of the development of thiouracil therapy and report an analysis of 35 cases. Each petient was thoroughly studied and all perthent clinical laboratory studies were made. They find that thiouracil brings about a complete remussion of symptoms in thyrotoricosis Available information indicates that it will accomplish all that surgery accomplishes in bringing about symptomatic relief. In Graves disease not previously treated with iodine, the effect is a quick and dramatic as the best results from iodine therapy, and in nodular toxic poster improvement occurs in from four to eight weeks in either condition the effect is lasting

In recurrent hyperthyroidsm thiogracil has brought about the relief of symptoms whereas

iodine has failed.

Peniatent symptoms following thyroidectomy with a normal basal metabolic rate may be relieved by suppression of the basal rate slightly below nor

mal with thiouracil.

Thiouracil acts by inhibiting the formation of thyroxin, probably by direct action on the thyroid gland. In patients previously treated with iodine

improvement is delayed.

As a preoperative measure, thiouracil is effective over a prolonged period, which makes it superior to iodine. Toxic effects of the drug may be serious. They can be minimized by cautious administration of the drug for the first few days and by limiting the

dosage to o.4 or to o.6 m. per day
Thiouracil gives promise of leading to a medical
cure of thyrotoxicosh and equah and, in many
instances b an improvement over any previous
form of therapy Time may prove that it is of
greatest value when used in conjunction with surgery At this witting it cannot be said how long it
will be necessary to continue the drug nor what unforteeen systemic effects may arise from its prolonged
usage. Secondary systemic disturbances found in
hyperthyroidism may be expected to abow improve
ment as hyperthyroidism improves

In several patients with nervous instability not associated with hyperthyroidism, suppression of the basal metabolic rate with thiouracil has had no effect on symptomatology BEGRARM GOIMAM, M.D.

Bissell, G W : The Magnesium Partition in Hyper thyroidism with Special Reference to the Effect of Thioursell. Am J. M. Se., 1945, 210 95

Diffusible and nondiffusible serum magnetium fractions were determined in as hyperthyroids and 18 normal persons. In the thyrotoxic coxes, the nondiffusible fraction ranged between 5 per can of the total serum magnetium, with an average of 30,5±1 9 per cent. In the normal persons the nondiffusible fraction varied from 17 to 45 per cent of the total, with an average of 30,4±1 per cent. The author's data inducte the average total diffusi

ble and noedifiusible serum magnesium levels of hyperthyroid patients to be slightly lower than the comparative average values for normal individuals. However, the average value for the percentage of nondifiusible magnesium is almost kientical in the two groups. The range of the percentage of bound magnesium in hyperthyroidism is strikingly varied, being just twice as great as the range for normal individuals.

Thiouracil apparently has no constant effect on the magnesium fractions in hyperthyroidssm. It is suggested that the variability in the magne

It is suggested that the variability in the magne sium fractions in thyrotoxicosis is the reflection of alterations in the metabolic processes.

Винјамин Социнан, М D

Lous, P: Nine Cases of Graves Disease Developed in Connection with Thyroid Gland Therapy Acts. med. mend 945 83

Histories are given of o cases in which exophthalmic gotter developed during or shortly after thyroid medication. In y of the cases the treatment had been given for simple obesity. The treatment had been outlined for periods of from one month to several years. All of the o patients presented indications for subtotal thyroidectomy which was performed in 7 cases after preoperative iodine treatment. The results of operation were good. Two of the patients refused operation. Not only were the clinical fea turns those of Graves disease, but histological examination showed the typical histological picture of this disease.

The conclusion to be drawn from these cases is that thyroid gland preparations should never be given for obesity AUDREY G MORONN M.D.

Brunn, E. Exophthalmic Golter Developing after Treatment with Thyroid Preparations. Acts and cound 945 22 3

In the Medical Out Patient Department of the Rightopital in Copenhagen from January 1900 to September 1944, 15 Patients were treated for thyrotoricosis that developed after taking throof preparations. This constituted 3 per cent of the total of the patients which thyrotoricosis treated for the total of the patient of the patient and the patient and the patient at the total of the case. A table is given in the original article above, the clinical data in these cases. All of the patients were women, most of them in the climacteric agroup. In 1 of the 18 cases the thyroid medication had been given for simple obesity. It was given for myrachems in only 3 cases.

The question arises as to why so few patients who take thyroid therapy develop thyrotoxicosis and the answer lies in the fact that a predisposition to thyrotoxicosis seems to exist in certain individuals. Such a predisposition has been demonstrated in 45 per cent of the patients in whom thyroid disease follows the administration of thyroid therapy.

Four of these patients showed a pronounced unilateral exophthalmos. This symptom was also re ported in 3 of the 28 cases of exophthalmic gotter following thyroid therapy that have been described in the literature previously. Therefore, if patients with thyrotoxicous show marked unilateral exophthalmos they should be questioned carefully as to whether they have had thyroid medication.

It is estimated that in Denmark the amount of thyroid preparations consumed is 3 times as great as that required for the existing cases of mynedems. The greater part of this excess of thyroid is used by patients with obesity. Thyroid treatment should hever be given for simple obesity and the public should be warned of its dancers.

AUDREY G MORGAN M.D.

Ljunggren E.: Surgical Treatment of Gotter Especially of Toxic Golter (Hyperthyroldism) In Sweden Acts char road 1044 80 546

Graphs are presented showing the increase in the mmber of thyroidectomies in the bospitals of Sweden from 1930 to 1942. This increase applies to both tone and aomtoric cases. The number of operations for hyperthyroidism nearly tripled in this period being 536 in 1950 and 1,460 in 1942. The operative mortality decreased during this period from 4 to 2 3 per cent. During this same period the number of medical deaths from hyperthyroidism that is deaths without operation decreased about 30 per cent. The number of operations for montoric gotter more than doubled during this period 5 for being per formed in 1940 and 1,397 in 1942. During the whole period the mortality from this operation was less than 1 per cent and during the last 2 years it was only 0.2 per cent.

Results have been improved since the introduction of preoperative iodine treatment in 1935 and also by improved postoperature treatment with lodine, glucase, and vitamin B. Patients with hyperthyrodism are particularly sensitive to infection and if pulmon any infections can be prevented the patient's life can often be saved. Early operation in advisable in hyperthyrodism before the heart and other organs, particularly the liver have been damaged beyond repair. America Gaussian M.D.

### SURGICAL PATROLOGY AND DIAGNOSIS

Christensen A.: On Carotid Body Tumors fide chir word, 1041 88 453

The anatomy histology, and physiology of the carotid body are discussed and photoemerographs given of some typical tumors. The subjective symptoms of carotid tumor are elight as a rule. The most characteristic objective symptoms are the location of the tumor and its relation to the carotid arteries. Entirpation is the only radical treatment. Irradiction alone should not be given unless operation is contrained cated or impracticable as these tumors are generally radioresistant.

Some surgeous advise against operation in these tumors on account of the great risk, while others advise operation in spite of the risk. About 10 per

cent of them become malignant. The most serious complications are lesions of the carotic atteries or jugular vein followed by fatal hemorrhage or air embolism. Hemorrhage can be controlled by placing a tipe around the common carotic artery at the beginning of the operation. When the internal jugular vein can be isolated from the tumor allgature should be placed centrally and peripherally from the tumor and the fixed piece of vein resected. The danger of air embolism can be prevented in this way

The author describes 7 cases of his own 5 in females and 2 in males the ages of the patients varying from 24 to 60 years. In 6 of the cases the growth was on the right side and in 1 it was on the left. The diagnosis was established before operation in all of the cases. In 2 cases primary extirpation were done and in 3 cases blopsy only was done. There were no complications in 6 cases. In the seventh there was a hemplegar which, however disappeared in 2 weeks. Histological examination showed 5 cases of tropical carotid tumor 1 case of fibroria and 1 of neuronoma. There were no signs of malignancy in any of the cases. Advant G Moscaa M.D.

Rottino, A., and Howley C. P : Osteold Sarcoma of the Breast; A Complication of Fibroadenoma Arch. Path., Chin, 1945 40 44.

The authors present a case report of an unmutal tumor of the breast containing extend taste. Their patient suffered from a rapidly governg neoplasm which recurred three months after it was removed and which caused death in ten months despite intense reentigen therapy

Although the regional lymph nodes remained free, the lungs became seeded with metastases. One of the outstanding gross characteristics of this type of tumor was present in theirs namely, a large cyst filled with necrotic, hemorrhagic debris. The cyst had evidently developed through a process of necross and liquefaction of a portion of the tumor Hemorrhage represented a late complication.

The tumor lisell was abundantly cellular and the cells were polymorphic. Outstanding among these were numerous multinuclear guant cells. Another important finding in the case was cateoid tusue described in only 0 of the 25 cases assembled from the literature.

In 10 of the cases reported in the literature, fibroadenome was observed in Intimate association with the giant-cell tumor. In some cases there were only remnants of fibroadenoms in a few others the main tumor was fibroadenoms and the osteond and giant-cell phase of the growth was observed developing within it.

Stilling was the first to propose that the giant-cell tumor arose in the fibroadenoma. Many have since agreed with him lacinding the authors. Granting this to be a fact namely that a stage of uncompil cated fibroadenoma proceeds the cancerous phase one can see a meaning to the chincal awareness of the tumors for twelve minuteen and even thirty years

2 exceptions was 25 per kgm, of body weight. The amount of swelling was either comparable with or less than that found in Group II and in those experiments in which the ligatures were removed one hour after the trauma, there was little additional swelling apparent. This was indicative of early arrest of hemorrhage while the limb pressure was low. The systemic blood pressures were in some instances slightly to moderately reduced, but in no case did sbock develop.

In those animals which were sacrificed from one and one tenth to three and one tenth hours after trauma the local fluid loss with a few exceptions was less than half that of control Group I, and was not enough to produce shock. The animals that were allowed to survive were in good condition the fol-

lowing day

In Group I the rapid swelling of the limb and the large amount of local fluid loss (which at necropsy was found to be blood in very large measure) are evidence that factors other than hemorrhage did not play an important part in the production of shock and death. In Group II the animals were protected from shock through the action of the spinal anesthetic in blocking the vasomotor and (less important) motor nerves lowering the blood pressure, and reducing the hemorrhage below a level that produces shock. There was no evidence that blockage of nociceptive stimuli was an important factor in preventing abook. In Group III the tranma was greater than in Group I and as the nerves were intact, the flow of nociceptive stimuli should, there fore, have been as great as or greater than in Group Still shock did not develop

There is no evidence in these experiments of an important action from toxins formed in the damaged tissues since, if present, it should have been manifest in Groups II and III in which the trauma was greater than in Group I in the animals in Group I the onset of shock was too rapid to have been

caused by toxins.

Swingle and coworkers confirmed the work of others that section of the perves to the limbs or of the aninal cord at the thirteenth thoracic or first lumbar vertebra does not prevent shock from limb trauma. This would preclude the possibility that any protection obtained from procuine injections of the nerves or tissues was the result of blockage of nociceptive stimuli from the traumatized regions. The theory that the descending tracts of the ventromesial areas of the cord protect against limb-trauma shock, but that afferent nonceptive stimuli from the legs, apparently transmitted by the ventrolateral cord regions, climinate this factor and sensitize to shock, was tested experimentally as follows the left dorsal spinal nerve roots below the twelfth thoracic vertebra were sectioned, which destroyed all afferent impulses from the left limb. When the limb was subsequently transmatized there was no sign of protection against shock, as the animals tolerated blood loss and tissue damage no better than did the normal JOHN L LONDOURN M D does of Group L.

Phemister D B., Richelberger L., and Lacriar C. H.: Early Effects on Dogs of Section of the Eighth Cervical Segment of the Spinal Cord and Their Bearing on Shock. Inch. Surg

Since it has been considered that nervous factors may play an important part in the production of surgical shock by lowering the blood pressure and impairing the circulation, it should be of interest to study the physiological morphological and blochemical reactions in animals in which the blood pressure is lowered by the alteration in nervous function which follows section of the eighth cervical seg ment of the spinal cord.

The most immediate general effects are motor and sensory paralysis distal to the level of section and vasomotor paralysis complete except for the vasodilator fibers to the chords tympani and glossopharynges! nerves and the antidromic pathways of the posterior roots of the cervical nerves. After a brief initial rise there follows a marked fall of blood pressure, a slowing of the pulse and respiration, a fall of the body temperature and a variable degree of depression or stupor which usually wears off within 24 hours. The excitability of all somatic, vascular, and visceral reflexes posterior to the section is diminished. This early state of the animal was defined by Sherrington as spinal shock.

The most widely accepted theory as to the cause of the fall in blood pressure following section of the spinal cord at the eighth cervical vertebra is that interruption of the pathways to the sympathetic nervous system cuts off vasoconstrictor impulses coming from the higher centers. Diminution of respiratory movements by paralysis of the intercostal muscles and of intra-abdominal tention by paralysis of the muscles of the abdominal wall contributes somewhat to the hypotension. It has also been maintained that the flaccid paralysis of skeletal muscles from the interruption of motor pathways results in dilatation of the capillaries venules and veins and that the subsequent pooling of blood from lack of extravescular muscular support is an important contributing factor to the lowering of the blood pressure and the impairment of the general circulation. This theory is contradicted by the decided fall in blood pressure which results from inhibition of the vasoconstrictors produced by stimu lation of the depressor nerves and there is still doubt as to the degree of its importance.

The state of pronounced general depression and low blood pressure known as spinal shock, which follows section of the eighth cervical segment of the spinal cord in dogs does not lead to surgical shock if the animals are given adequate fluids food, and nursing care. The general depression gradually decreases while the blood pressure pensits at the upper limits of the shock level for from 4 to 6 days before the onset of a slow, gradual elevation to preoperative levels. During this acute period of vasodepression there is additional evidence of impairment of the circulation, as shown by a moderate to severe reduc

tion in the erythrocytes hemoglobin, and red cell volume. Limited studies indicate a slight reduction in the total blood volume There is also a significant reduction in the serum protein and the oxygen and carbon dioxide content of the blood Changes in the water chloride and sodium concentrations are small. Calcium concentrations are reduced, while potassium concentrations show a noticeable rise. The most important cause of these changes appears to be the trapping of crythrocytes in the tissues un der conditions of vasodilation and low blood pressure

When after section of the cord the animals were kept in the dorsal position on the operating table with wounds in each thigh for the insertion of can mulas in the femoral arteries and fluids and food were withheld, they reacted the same as the other group of animals during the first 6 to 12 hours. Thereafter the general depression began to increase and the blood pressure declined usually to very low levels where it remained for from 12 to 24 hours with the animals in a state of shock until death occurred. The hematological changes were similar to those of the earlier period of the first mentioned group except that there was a terminal trend toward hemocon centration. Necropsy revealed evidence of acute degenerative changes in some of the tissues which

were interpreted as being due primarily to anoxia In both types of experiments the animals were def initely more resistant to low blood pressure than has been found to be the case with animals in which the blood pressure was reduced to equally low levels by hemorrhage or local loss of fluid from injury This is interpreted as being due to the fact that after the section of the cord there are vasodilatation and bet ter nutration of the tissues than is the case after straight hemorrhage or the local loss of fluids from an injury with low blood pressure in which there is vasoconstriction. The observations support the view that a low blood pressure produced by the ex chason of vasoconstrictor activity whether from direct injury of the pathways or from reflex inhibi tion, causes less impairment of the circulation and kes tendency toward shock than does an equally low blood pressure produced by hemorrhage or by local loss of fluid from injury The administration of ade quate amounts of water electrolytes and food protects against circulatory failure when the blood pres sure is at a low level as a result of the exclusion of vasoconstrictor activity by a spinal cord injury

BENJAMIN GOLDMAN M D

Mahoney E. B., Howland, J. W., and Yackel, K.
The Role of Infection in Shock Produced by Muscle Injury Surgery 1945 17 805

Shock was produced in dogs by means of the Blalock crusher The inoculation of virulent cul tures of the streptococcus hemolyticus and the cloatridium welchii into the thigh muscles just before application of the crusher modified the resulting shock. The survival time of animals inoculated with the former organism was two hours less than that of the control animals and of those inoculated

with the latter organism it was three hours less than that of the controls The staphy lococcus aureus in jected into the thigh muscles before injury did not alter the survival time under the conditions of these

There was no greater stuid loss in the infected animals than in the controls and the decreased aurvival time was considered to be due to the in fection of traumatized muscle and to circulating bacterial toxins The infected animals did not have a secondary rise in blood pressure following the JOSEPH GASTER, M.D.

### MEDICAL JURISPRUDENCE

Bloomfield J J: Labor Management Relations. J Am M Ass 1945 128 639

Industrial hygiene as a science and as a public health service has been developed with the objective of protecting and promoting the health of the work ing population in an industrial system Govern mental agencies have taken action in solving industrial health problems because such action is a proper obligation of public agencies. Management nas co-operated partly because of the necessity of the requirements imposed by certain types of work men a compensation acts and partly because man agement has gradually realized that there are other phases of the problem in need of attention It has aiready begun to extend its aurgical treatment work into such functions as pre-employment and periodic physical examinations, and in recent years into medical and engineering control of occupational diseases and job placement. Finally at present attention is being devoted to such problems as general illness among workers and to such factors as fatigue dental hygiene, nutrition mental health and similar adult health problems Labor as represented by both organized and unorganized workers has had a lesser role in this development, largely because strong organization is necessary for effective action, and until recently unions have not been well enough established to allow them to give attention to the advancement of special welfare programs

There is no reason, however why labor cannot accomplish tasks in relation to the social front as it has aiready done through years of hard work on the political front. It will probably not be necessary for labor to go through as long a period of self-education as did management, since many of the patterns in this field of effort have already been developed however the labor front should go slowly and recognize that it has a good deal to learn in the field of industrial health. Labor will find official and non official health agencies ready to assist it in this

Co-operation between labor and management appears still to be in its infancy, more education in the technique of co-operation is needed for both industry and the unions Labor-management com mittees sponsored by the War Production Board have served a useful function in stepping up production for the war effort however when they have functioned in the permanent health and welfare activities the results have not been impressive Attention to workers health has been perfunctors new opportunities for the improvement of working conditions and the worker's health have not been explored extensively by the labor management committees In fact, Robert Watt, labor member of the War Labor Board believes that collective barraining under the Board itself has served already to accomplish far more than these committees can do the Board stacil as distinguished from its commritees being the best demonstration of the value of economic democracy. It is true, of course that the union agreement between management and labor negotiated through collective bargaining (as sponsored by the War Labor Board) offers one channel for the improvement of industrial health and work ing conditions. Health and safety provisions are specified in a number of existing contracts, however a study of the health and safety clauses shows that these provisions have been made in order to protect workers from unfair application of company reg

ulations to right some specific gnervance or to correct some single outstanding hazard as far as onbe determined, so unkn agreement provides for a broad industrial health program in the industryconcerned with a view to long term reduction of sixtures and the proposition of positive health.

All in all the major health problems of the working population cannot be solved by union agreements or by labor alone

A comprehensive national health program administered by state and local povernments would meet the needs of all groups for health and medical soverice, boaghalt care and prevention of disease. It would be far more desirable to revise and strengthen our present law on health and safety requirements, and especially their enforcement provisions. In such manner benefits of such law could be applied to all workers rather than to those who happen to be strong enough to obtain concessions through contracts. Through such collective action on the legislative front the rights of seither manner ment nor labor nor their free functioning will be impaired.

January Bassaras, M D

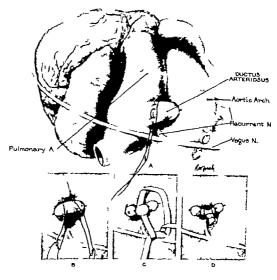


Fig. A, Pursestring soture placed and field on sortic side, placed but not tired on pulmonary side. B Both pursestring sotures field matters sotures placed C M tirres sotures used umblical tape figsture placed. D Umblical tape figsture placed. D Umblical tape figsture placed.

Operative Closure of Palent Duct a Arter sus -Alfred Blalock

## **SURGERY**

### GYNECOLOGY AND OBSTETRICS

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# OPERATIVE CLOSURE OF THE PATENT DUCTUS ARTERIOSUS

ALFRED BLALOCK M.D. F.A.C.S. Baltimore Maryland

LTHOUGH a procedure for closure of the patent ductus arteriosus had been described by Munro in 1907 and al though the operation had been at tempted by Strieder (1) the first successful closure of an open ductus was performed by Gross (3) in 1938 The first method used by Gross was that of simple ligation of the duc tus. It is well known that the lumen of a large artery which is closed by ligation in con tinuity may become patent again as the ligature cuts through the wall Gross aban doned the method of simple ligation after having used it on 14 patients because there was evidence that the occlusion did not remain complete in several patients consistent closure of the ductus was obtained by Gross in 28 patients by the use of a second method in which the ductus was ligated and was also surrounded by cellophane Some recurrences developed after this procedure and these led Gross (2) to develop a third method which consists of complete division and dosure of the ductus. This procedure had been used on 14 patients at the time of the last report and the results were satisfactory

It is because I question the necessity and safety of performing an operation in which the ductus is cut across and the ends closed

From the Department of Surgery of The Johns Hopkins University and Hospital.

that this brief communication is presented

During a period of slightly less than 3 years my associates and I have operated upon 10 patients with patent ductus arteriosus most of whom were referred by Dr Helen Taussig There have been no serious accidents during the operations and no postoperative deaths in the hospital Two of the 6 nationts who had a Streptococcus viridans infection died subsequent to discharge from the hospital There was definite evidence in only i patient that the lumen of the ductus became re-established following the initial closure Two ligatures of braided silk were used in closing the ductus of this patient. It was noted at the time of operation that the ductus was quite short and that the ligatures overlay each other Following the development of evidence that the ductus had reopened a second closure was performed. This patient had a Streptococcus viridans infection and she died 31/2 months following the second opera

We have used a number of different methods in our small series of cases. It is difficult to compare the effectiveness of the different methods because there has been evidence in only the i case referred to that the lumen of the ductus became re-established. In the earlier cases we used two ligatures of braided silk with or without an additional ligature of

umbilical tape. In 2 patients the recent meth od of Gross (2) was modified to the extent that pursestring sutures of silk were placed at the extreme ends of the ductus. These were tied loosely and two straight clamps were placed on the ductus between the pursestring sutures. The ductus was divided between the clamps and the ends were closed with suture ligatures. Although no difficulty was encountered it was felt that the division of the ductus probably exposed the patient to un necessary danger of severe hemorrhage. We then adonted the method which has been employed in 7 patients and which is used at the present time. The entire length of the ductus is carefully dissected free of the adjacent structures. Pursestring sutures of medium silk on French needles are placed at the two extreme ends of the ductus. The adventitia is caught in the suture in several places. These sutures are tied loosely yet sufficiently tightly to about the flow of blood through the ductus. Two through and through mattress sutures of silk are placed and tied between the two nursestring sutures. A ligature of umbilical tape is then tied over the mattress sutures of silk. The method is shown diagrammatically in Figure 1

Figure 1
There has been no evidence in the patients in whom this method has been used that the lumen of the ductus has become re-established. If subsequent experience corroborates this im

If subsequent experience corroborates this im pression, it would seem that the method is preferable to that of division of the ductus because it subjects the patient to less danger of fatal hemorrhage. Even if division and closure of the ductus proves to be the method of choice it would seem that the procedure can be made less dangerous by the preliminary placing of pursesting sutures at the extreme ends of the ductus.

#### RUFERENCUS

G Mairt, A Stringer J M and Bover, N. H.
Am. Heart J. 048, 5.0
2. Goss, R. E. Surg Gyn Obst. 044, 75.36.
3. Gross, R. E. and Hissann, J. P. J. Mn. M. Ass.,
4. Michael J. C. Man. Surg. 00. 46. 135

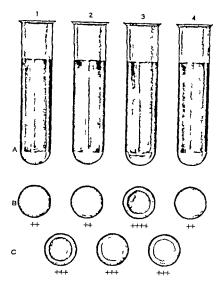


Fig. Blood anytain activity as neasured by currous made pecclicitation. A soluble started has used T measure decreased flood anytain activity it is advisable t use more sensitive starch. Ros. A Tube is normal control with a very small amount of light brow curpous code precipitat uniformly distributed on the bottom. This may sometimes come down as a very slender yellow ring.

very skinding vielow ring.

Tube 2, Case 7,833,5 group is read as normal though trille more precripitate appears in t than in the control. The test was done during an
attack of cholangits. It as repeated twice and found normal on both
occasions.

Tube 5, Case 73 96, group 5 or Case 3 Table I, with blood amylase activity marketly increased. Acute hemorrhapic paincreafitia found at necropsy (see Fig. )

Table 4, Case 73, 5c, group or Case 3T ble I with blood anylase activity towned. Choole penceratist from 1 to open tion. This patient recovered Row B. The bottoms of tubes in Row A. Row C. Variations in the rings or bottoms of percepitates obtained in soloble starch. When the sorre sensitive starch is used this is the type of precipitate one is spet t. get with the normal control.

#### BLOOD AMYLASE ACTIVITY IN PANCREATITIS AND OTHER DISEASES

#### A Simple Diagnostic Aid

#### DAVID POLOWE M.D. F.A.C.S. Paterson New Jersey

T is the purpose of this article to call at tention to the evaluation ase activity in pancreatitis and other diseases and to a simple diagnostic aid (16), which measures blood amylase activity in terms of cuprous oxide precipitation. The test is almost as simple as the determination of sugar in urine and it has now been used with increasing success for over 4 years

This study is based on 78 blood amylase activity determinations in 60 patients In 62 patients the diagnoses were proved by accept able criteria such as necropsy operation biopsy x ray laboratory or combinations of these Though in 7 patients the diagnoses were unproved the cases have been included in this series for the more conservative statistical evaluation of the incidence of proved pancreatic disease. In 63 patients the tests were run to rule in or to rule out acute pan creatitis carcinoma of the pancreas or to determine the blood amylase activity in bili ary tract and other diseases. And the test was run in one case of pancreatic collection (pseudocyst) which was observed at the Newark City Hospital the complete report of which is included in this series through the

#### CASE REPORTS

courtesy of Dr R O Bauman

In this series of 69 cases there were 6 cases of acute pancreatitis proved at operation or at necropsy The case of pancreatic collection was proved at operation Because of its clin ical importance a case of mesenteric and por tal vein thrombosis associated with a marked blood amylase activity is also reported

CASE 1 History No 73165 M L. female, white aged 45 years housewife was admitted to the hos pital Viav 15 1943

From the General Surgical Service Barnert Hospital, Paterson, New Jersey and the Thoracic Service, Bergen Piacs Hospital, Ridges ood, New Jersey

About 1 month prior to admission the patient suffered indigestion. She vomited after breakfast and had severe pain over the entire lower abdomen The attack was accompanied by belching a bitter taste, and pain which radiated to the back and to the shoulder blades. She gave a history of previous attacks of a similar nature

On physical examination a marked enlargement of the abdomen was noted. A smooth hard mass was felt in the pelvic region below the umbilious. This mass was movable and not tender marked distention in the epigastrium and tenderness over the gall bladder region. However the gall bladder could not be felt.

In the left upper abdomen there was a mass just below the left costal border which extended back ward toward the kidney. There was tenderness in the left costovertebral angle. This mass felt more like the kidney than the spleen. It was thought that free fluid was in the peritoneal cavity. Moderate icterus was present.

Laboratory examinations of blood May 15 1043 showed acterus index 35 hemoglobin 12 grams per cent red blood cells 4,440 000 white blood cells 21 200 with large mononuclear leucocytes 4 per cent, lymphocytes 6 per cent eosinophiles none band forms 9 per cent polymorphonuclear leucocytes 81 per cent. Examination of the urine showed specific gravity 1 org a trace of albumin no sugar no acctone on microscopic examination there were found a few white blood cells an occasional red blood cell no casts

On May 18 1943 3 days after admission a blood amylase activity test was performed and found to be normal (2 plus) (see Fig 1 row A tube 4)

On May 27 10.13 12 days after admission a supracervical hysterectomy was performed. At oneration the gross findings were those of a large uterus with intramural fibromyomas cholelithiasis free fluid in the peritoneal cavity, and fat necrosis in the area of the pancreas

On June 10 1943 the patient was discharged recovered She was readmitted in August 1043 and on August 23 1943 a cholecystectom) was per formed and the nationt was subsequently discharged

recovered.

Pancreatitis as a cause for this patient s chief complaints was definitely considered prior to operation. The blood amylase activity test was found to be normal It is a known

fact that blood amylase activity rises sharply at the onset of an attack of acute paicreatitis and may subside just as sharply within 72 hours of the onset. For that reason one should not sacrifice the judgment gained by years of chinical experience for a noncorroborative diagnostic laboratory and Briefly a normal blood amylase activity report does not rule out the presence of acute paicreatitis whereas a moderately or markedly increased blood amylase activity rules strongly in favor of acute pancreatitis.

Attention is invited to the fact that the patient was observed for 12 days prior to the first operation when the pelvic pathological lesion was removed. The initial symptoms had subsided the patient was in good condition for operation all thoughts of acute pan creatitis had vanished in the light of the normal blood amylase activity so that the presence of fat necrosis in the area of the pancreas came as a mild surprise.

CARE 2 History No 72405 D \ female white aged 53 veras was admitted to the hospital March 20 1943 with a chief complaint of pain in the epi gastrium of 6 months duration. The pain was more severe after she ate heavy food and was occasionally associated with vomiting. In the past 3 months the epigastric pain was much more severe and came more often. She had lott to pounds (4 5 kgm.) of weight in the past 3 month. The epigastric pain had

been very severe for the past to dava. On physical examination there was found a definite tenderness in the epigastrium and right upper quadrant of the abdomen. A mais was palpable in the gall-bladder region and it extended two fugers below the costal margin. The temperature was codegrees (37 a C) pulse 68 regular blood pressure 130 millimeters of mercury systolic, 80 millimeters of mercury distributions.

Laboratory examination of unne showed specific gravity 1 on albumin, a trace no signs actions a trace Examination of the blood showed hemoglobin y grains per cent red blood cells 3 600000 white blood cells 7 000 with large mononoider leucocyte 2 per cent, lymphocytes 14 per cent, cosinophiles 1 per cent, polymorphometicar seucocytes 83 per cent

Chrical impression acute cholecyatitis
On March 33 0.43 3 days after admission, opera
tion was performed. A hemorrhagic panerestitis
with fat necrosis cholecyatitis and cholelithiasis
were found. Cholecyatostomy removal of gall
stones and drainage were done.

The pathologic report (by Lt. J Churg) (1) Por tion of gall bladder wall showed edema and chro ic inflammation (2) choici thiasis (3) portion of fat tissue showed small areas of necrosis

The blood ampliase activity test was performed 3 days ofter the operation and was moderately (3 plus) increased. The patient was not relieved by the operation. She became depressed continued to vomit and finally expired on May 1 1943 39 days after the operation.

Since only one blood amylase activity test was performed we are left in the dark as to the changes that took place in the pancreas from a secretory point of view. There was no necropsy so we do not know the exact cause of death. We were left with the impression that a moderate blood amylase activity in crease may be associated with a serious prognosis in acute pancreatitis. This case also emphasized the fact that blood amylase activity test should be run every day or every other day since it is known that blood amylase activity usually parallels the course and the clinical symptoms of pancreatitis (10).

CASE 3 History No 73106, J J male, aged 69 years, was admitted to the hospital May 17 1943 and died May 19, 1943

His chef compilant was severe abdominal pain and vomiting. The onest occurred on May 13 1913 with pain in the precordium which extended down the left arm. This recurred the following day. May 14 1913 On May 17 1013 the patient was selsed with severe pain in the upper abdomen followed by continuous womlting. The patient then developed severe shock associated with a subnormal tempera ture and a cold clammy skill.

The patient had had an attack of severe abdominal pain followed by nauses and vomiting in October 1941 At that time there was some tenderness over

the abdomen but no rigidity

Physical examination revealed a soft distended abdomen, with n areas of rigidity but tenderness

was present on pressure and ribound Laboratory examinations revealed white blood cells at 500 with a marked shift to the left. The blood mydate cienty was markedly increased (a plus) (see Fig. 1 tow A, tube No. 3).

The patient went rapidly downfull with a rising temperature. He died 48 hours after admission.

The pathologic diagnosis (necropsy by Lt J Churgh was as follows acute hemorrhagic pancreatitis widespread pentoneal and retroperitoneal fat necrosis periesophageal fat necrosis hemorrhage effusion in the peritoneum (800 c.c.) and in both picural spaces (100 c.c.) chronic cholecytuin and cholelithiasis, pulmonary emplysema actectasis of both lower lobes pulmonary edems and congestion artenosclerosis of the kidows.

Acute hemorrhagic pancreatitis was the cause of death but coronary thromboais was the foremost clinical diagnosis in the minds

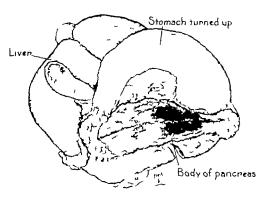


Fig. 3 Gross speciment of Case 23/00 group 5 or Case 3, Table I. The under surface of the liver the gail bladder and the stomach are turned up. The pencers also been cut transversely and opened like a book. The acute bemorthagic process can be seen in the body and the tail of the pancreas. There were numerous plaques of latnecrosis in the head and tail of the pancreas as well as a the peritoneal and retropertoness structures.

of the attending physicians for 3 days prior to admission of the patient to the hospital when the clinical state of the patient was that of epigastric pain and vomiting. A diagnosis of acute hemorrhagic pancreatities was then made and confirmed first by the marked in crease (4 plus) in blood amplase activity and then by necropsy (Fig. 2)

CASE 4 History No 76645 S E. male white aged 44 years was admitted to the hospital Febru ary 28 1944 with a chief complaint of severe epi gastric pain followed by nausea and vomiting. The present illness began a days prior to admission. In September 1943 the patient bad auffered a severe attack of epigastric pain associated with severe vocuting and nauses. There was no issundice and the pain radiated to the right shoulder. The pain started suddenly and stopped suddenly The pa tient was well for a weeks and then had a repetition of the symptoms named. In October 1943 an x ray series revealed the presence of stones in the fall bladder. Shorth after this the patient suffered another attack of severe epigastric pain. He waplaced on a strict diet and was free from pain until 2 days prior to admission on February 28 1944

On physical examination the patient appeared to be acutely ill. There was no clinical interus. The abdomen was di tended, and there was an a sociated marked rigidity and exquisite tenderness in the right upper quadrant of the abdomen over the gall-bladder region. There was no tenderness in the contovertebral angles. The temperature was 90 de grees (37 z. C.) the pulse 91 respirations 18

Laborators examination of the unne revealed reaction acid specific gravity 1 1030 albumin a trace sugar 3 plus acctone negative. On micro so jie examination a few white blood cells were found but no red blood cells no cat so or bacteria were present. Blood count showed white blood cell 18 500 bemoglobin 17 0 grams per cent. red blood cell 18 500 000

Clinical impression acute cholecystitis with

Ch leavitectoms and choledochotoms were performed on the das of ailm son February 28 1034. A large amount of bloody fluid was present in the pentioneal casists. There was bemorthage into the patheria. Fat necrosis of the pancreas was present, and a large number of stones were found in the gail bla ider. The common lust was distended but in stones were found in the

March t 2044 2 lave after the operation a fleed amrilase activity test was jettle rmed and reported markedly increased (4 plu)

Pathelogue diagnosi (Ix Dr. V.J. Citlitz) acute che lecratiti with promin ni acute perich dece titi omental fat h iwing area of fat necrosi an in n specific acute inflammation chronic ch leep titi

TABLE L-SUMMARY OF 6 CASES OF PANCREATITIS PROVED AT OPERATION OR AT NECROPSY

Cesso No.	Hetsey No.	Diagnosis and researchs	Blood anylase activity
	71405	Chronic pencrustria, cholocystkia, chalchitissis. Operation 3-13-13 cholocystotomy Dard 3-1-13	3 plus. Test done 3 days pastoparative
	73295	Chronic parametricia, cholocystick, cholocytichush, Rosseyona uteri. Hest epiention p-ey-ag, kysteriumy Dichargad, properted, 0-to-ag, Second operation 8-ray-ag, cholocystichusy Dichargad, properted.	pius (normel). Test dens 6 days prior is sent apecation
3	12100	Acuts hemorrhegic pencrentitis, chronic cholocystitis, chalatelidade. Admitted 9- y-us. Dard p-19-us. Mecropsy	4 plus. Test done the day of administra
	76649	Acota hemorrhagic pancrealitis, chrucic chalecyathis, chalelitidash Operation s-si-es, cholecystactomy and choledochestomy. Decisarged 2-st-es, recovered	4 plant. That done days pestaporative
5	79823	Acuts hemorrhagis puncrenticis, chemic choiseparitis, choisifthinsh. Admitted 11-17-44 Operation 1-19-44, discatoliny Daid 1-90-44 Hactury	g plan. Test doos the day before specation
6	23077	Acote percreatifs (percreas indensited, notifier quotient with fat accretion). Chologouthemy performed 18 yr prior to present administration. Admitted grants Operation grants, choicechetomy. Discharged 0-68-15, measured.	a pinn. Test done days of her admission of pint 3 days later, associated with clinical improvement, 2 days prior to operation

On admission the patient was in no distress. She was well developed, well nourished, and exhibited no rashes or icterus. The positive findings were as follows blood pressure 130 millimeters mercury systolic, 90 millimeters mercury disstolic. In the left upper quadrant of the abdomen there was a mass about the size of a grapefruit which protruded only alightly above the abdominal contour. This mass extended into the epigastrium where it was tender. The possibility of two masses was considered.

Provisional diagnosis malignant growth of the stomach splenomeraly of unknown ctiology

Retrograde pyclography disclosed no pathological process cystoscopy disclosed none. Peritoneoscopy revealed a mass in lesser omental cavity perhaps a cyst of the pancreas the stomach displaced anteriorly & ray (bartom enema) examination revealed evidence of pressure at dutal third of transverse colon and spienic flexure probably due to extrinsic pressure chest examination revealed left disphragm flat and alightly elevated. Thoracic and lumber vertebrae showed no evidence of the presence of nathology

Laboratory examination of the urine revealed albumin, a plus, concentration good. Examination of feces for undigested fats gave normal findings Blood chemistry examination revealed normal values for sugar urea, nonputtelu ultrogen, and creatinin. White blood count showed 9 150 poly morphonuclear leucocytes 64 per cent. Red blood cells numbered 3,000,000 to 4,000,000 hemoglobin range was 56 to 60 per cent.

The size of the mass fluctuated slightly, and its tenderness was intermittent. On the fourth day of admission the patient awoke with severe substernal pain which did not radiate. This attack was accompanied by profuse disphoresis. Dyspues was expe rienced but no cyanous was visible. There were no

chest signs Clinical impression (1) possible small pulmonary embolus (2) possible coronary episode.

The abdomen continued to be painful and the pa tient was brought to surgery. A left rectus incition revealed a fluctuant mass above and behind the stomach. The foramen of Winslow was closed. A nick was made in the gastrohepatic mesentery and the mass was drained of about soon cubic centimeters of brown, bile-stained or coffee-colored fluid with little odor This sac was packed with plain gaure. The sac was marsupialized and the gaure was left hanging outside. The abdomen was closed in layers after a piece of the sac wall was excised for blopsy

The postoperative course was uneventful. The cavity continued to drain small amounts of coffee colored fluid. The drain was ultimately removed and the patient was discharged, 5 weeks after ad

A biopsy specimen of the cyst wall revealed fibroblastic timue Organisms were not found. The bleed emplace activity done several days after opera tion, by the cuproms oxide precipitation method (16) was found to be markedly increased (4 plus)

A letter from Dr Richard O Bauman, dated June 18, 1942 states 'Enclosed is a summary of the case you were interested in. She is now discharged even though she has considerable drainage

from the marsuplalized sac or cyst.

"It was the opinion of some of the men on the staff that this lealon came under the group classified as pseudocysts of the pancress. Biopsy of the cyst wall and other evidence such as a closed fora men of Winslow and the presence of old inflamma tory fibrosis seem to substantiate this but then again, we could not be sure. A follow up is in order The patient could not be followed up further

The increased blood amylase activity found in this case helped the staff lean toward a diagnosis of pseudocyst of the pancreas. Pinkham, in a review and analysis of 10 cases of pancreatic collections (pseudocysts) states that "Persistent elevation of the serum amylase following the signs and symptoms of pancreatits or pancreatic necrosis is significant, indicating the probable development of a pancreatic collection

Thus we are once again reminded that single blood amylase determinations while very valuable in the acute case are not as valuable as repeated determinations where the clinical diagnosis is in doubt and the condition of the patient permits study over a period of days prior to operation

#### ANALYSIS OF CASES

Group 1 Of the 69 patients tested 37 (53 6 per cent) were found to have a normal blood amylase activity. As we gained experience with the interpretation of blood amylase activity we discovered that a normal blood amylase activity is a true source of comfort. In only 1 instance (Case No. 73165 which is reported here in detail) was a proved pan creatitis found associated with a normal blood amylase activity and this patient recovered.

A white female, aged to years Case No 75446 was admitted to the hospital with a chief complaint of severe epigastric pain and vomiting. This was associated with an intense icterus She had had a cholecystectomy to years before. A gastrointestinal x ray series revealed the presence of a tiny hermation of the stomach through the diaphragm a duodenal diverticulum a shadow as of a stone in the region of the right kidney or gall-bladder bed. Consultations were held. A clinical diagnosis of common duct stone was made and it was desired to rule out an associated acute pancreatitis. The blood amylass activity was normal. A stone in the common bile duct was found at operation. The pancress was not inflamed. A choledochotomy was performed the stone was removed and the patient made an un eventful recovery

Case No 79776 illustrates the use of blood anylase activity determinations in the loca two of intestinal obstruction. In 1933 it was reported (15) that increased blood amylase activity may be found in high intestinal obstruction and in 1940 Johnson and Bockus reported an elevated serum inpase in intestinal obstruction. It is conceivable that pancreatic enzymes may be reabsorbed into the general circulation from severely distended small in testines before viability of their walls is lost testines before viability of their walls is lost.

In Case 79776 the diagnosis of intestinal obstruction was quite certain and the normal blood amylass activity not only served to rule out acute pancrantis but made it seem likely that the obstruction was low. At operation the fleum was found twisted on itself and so adherent to the posterior penetal wall of the pertioneum in the right vertebral guter that it could not be released without fear of tearing it. An ileostomy was performed. The patient died 12 hours later At necropey 5 days after the onset of the illness 1 foot of lleum was found gangrenous about 1 foot from the cecal end. This gangrenous loop of lleum was found firmly caught under a free edge of the root of the mesentery and explained the inability of the operator to free this 12 hours earlier.

Group 1 includes 3 patients with serious kidney pathology (cases Nos 77210 80353 and 82145) with carcinoma of the right kid ney left pychtis cystics and uremia respectively. Since urine excreted by normally functioning kidneys has an amylase activity of 2 to 6 times that of blood many attempts have been made to correlate kidney function with blood amylase activity or urinary amylase activity. It is reasonable to expect a nor mal blood amylase activity in the first 2 cases mentioned because only one kidney was involved in each of these patients. In the third case in which the patient died of uremia one is at a loss to account for the normal blood amylase activity for with markedly diminished kidney function one does expect an increased blood amylase activity. How ever the problem is not as simple as all that for it is conceivable that associated liver dam age may be the responsible factor. Consider able study is required to correlate kidney function with blood and urinary amylase activity Dozzi has concluded that there is no quantitative relationship between blood and urmary amylase

Eleven patients with biliary tract disease appear in group 1. Since in our experience acute pancreatitis was found associated with biliary tract disease in all (100 per cent) of the 6 proved cases of acute pancreatitis a normal blood amylase activity in biliary tract disease has come to be regarded by us as safely excluding an associated acute pancreatitis or that a pre-existent acute pancreatitis is substitute.

Group 2 In group 2 are 7 cases with de creased (1 plus) or absent (zero) blood amyl

ase activity (10 t per cent of the 69 patients observed) In this group the decrease was in no instance associated with acute pancreatitis.

The liver is considered by some observers, among them Dozzi to play some part at least in the formation of amylase For that reason a decreased or absent blood amylase activity has been interpreted as evidence of impaired liver function. Lewison has reported a depressed serum amylase in liver disease Bartlett studied blood amylase activity in thyroid disease and concluded that a decreased blood amylase activity indicates in paired liver function in that condition.

A decreased or absent blood amylase activity may be found in any chronic, wasting disease such as tuberculosis (4 cases) or car cinoma (1 case) In tuberculosis amyloidosis of the liver is a common finding. In carcinoma of the stomach metastatic nodules may replace most of the normal liver tissue

There were 2 cases of biliary tract disease in group 2—decreased (1 plus) or absent (0) blood amylase

The first H. W., a white female, aged 63 years was admitted with a chief complaint of severe right upper abdominal pain. This pain was associated with an intense icterus. V ray examination disclosed a nonfunctioning gall bladder. The labora tory reported a blood picture of severe peralcious anemis with a red blood cell count below two million. The blood only sea activity was decreased (1 plus). The patient improved remarkably under crude liver extract therapy and was discharged, improved. A year later she suffered another attack of gall-bladder coile and submitted to operation chronic cholecysticitis and cholellibrasis were found coblecystetomy performed and the patient is alive and well today though she has to continue with liver extract therapy.

Since in Group 1 there were 2 cases of per microus anemia (Nos. 72400 and 81248) and 11 cases of biliary tract disease one cannot be sure that pernicious anemia per 18 is responsible for the decreased blood amylase activity in the first case in group 2 (H W) nor that the biliary disease is responsible for the decreased blood amylase activity in both Case 1 H W and No 74702 in group 2

Suffice it to say that in the present state of our knowledge of decreased blood amylase activity one may safely regard such decrease as ruling out serious pancreatic disease. And that while a decreased blood amylase activity may point toward decreased liver function one should use other and better known liver function tests when the function of the liver is under investigation

Group 3 In group 3 there were 9 cases with alightly increased (21/2 plus) blood amylase activity (13 1 per cent of the 69 pa tients observed) In none of these were we able to prove that acute pancreatitis was present. Several impressions were gained from a study of these cases of slightly in creased blood amylase activity (a) single de terminations of blood amylase activity are not as valuable as repeated determinations (b) a mild pancreatic edema accompanies such clinical entitles as biliary tract disease, blockage of the lymphatic system and in pneumonitis secondary to cardiovascular discase (c) that variations in blood amviase activity may be expected in thyroid disease

Whenever a single determination of blood amylase activity is reported as slightly in creased the test should be repeated every day or every other day. In a pancreatitis which is subsiding, remaining stationary or is get ting worse there is usually a concomitant decreasing stationary or increasing blood amylase activity. This statement is based not only upon my own experience but also upon the experience of others notably Mc Corkle Goldman and Cornell who made 900 blood amylase activity determinations in 48 cases using the method of Somogyi. They state Serum amylase usually perallels the course of the disease and clinical symptoms.

though the latter may clear before the blood amylase is normal.

When the bilary tract is involved as in Cases 73:89, 73:303 and 80:19 we are no longer surprised to find a slight increase in blood amylase activity since in all 6 of our proved cases of acute pancreatitis there was associated billary tract disease. This also brings up the question as to whether billary tract disease causes acute pancreatitis or whether chronic pancreatitis acute pancreatitis or whether chronic pancreatitis causes bilary tract disease. Weiner analyzed 4000 necropsies and found that "The incidence of gall-blad der disease is significantly increased in pancreatitis out the incidence of pancreatitis in

gall-bladder disease is only slightly if at all higher than in the general autopsy series. Colp. Gerber, and Doubillet state that cholecy stitis may be due to pancreatic reflux, and Wolfer has found that pancreatic juice may be the etiologic factor in the production of cholecystitis in the dog. Weiner was able to show that a common channel may exist be tween the common bile duct and the pancre atic duct without the development of acute bemorrhagic pancreatitis. Our pathologist Dr A. I Gitlitz states that reflux bile per se is not always a cause for pancreatitis. In the 2 of our 6 proved cases of acute pancreatitis which came to necropsy no bile was found in the pancreatic ducts and Dr Githtz states that he has examined postmortem at least 3 other cases of acute hemorrhagic pancreatitis in which no bile was found in the pancreatic ducts.

Dragstedt Haymond and Ellis have shown that in 60 per cent of the cases of acute hemor rhagic pancreatitis, there was an antecedent biliary tract disease. In 10 per cent of these a common channel was produced by the impaction of gall stones in the ampulla of Vater. In the majority of the remainder, a common channel was produced by spasm of the sphincter of Oddi or edema of the papills. They state that in cases in which bile is not the etologic factor then concentration of the alkali of pancreatic juice is the destructive factor just as concentration of acid in the gastrium may be the destructive factor in that location.

Thus a study of the literature makes it apparent that both the common channel theory' of bile reflux and the obstructive theory with its concomitant concentration of the alkaline pancreatic juices within the pan creas are both tenable etiologic factors in the production of acute pancreatitis. And the pancreatic reflux theory is a plausible explana tion for the high incidence of cholecystitis in pancreatic disease. When these theories are understood and reflected upon, it becomes easier for the clinician to interpret blood amylase activity in biliary tract disease and the need for repeated blood amylase activity determinations in the borderline case becomes more apparent

Blockage of the lymphatic system ma cause an increase in blood amylase activity In case No 73653 m which there was a mesen teric cyst about 15 centimeters in diameter and in case No 74118 in which there were re troperitoneal metastases from an embryonal cell carcinoma of the testes a slightly in creased blood amylase activity was found The mechanism of this increase in blood amy! ase activity cannot be explained entirely Shafiroff Price and Polowe cited by Polowe (14) ligated the thoracic duct and the com mon bile duct in 1 dog (dog 4) There was an immediate rise in blood amylase activity and this rise was sustained for 48 hours when the dog died One can only speculate as to whether the ligation of either duct alone would produce this result or whether it takes both conditions combined to do so. The impression at present is that since the lymphatic system is in close communication with the venous system throughout the body lymph with its accompanying enzymes backs up into the general venous circulation when the lymphatics are blocked

Popper and Necheles cannulated the tho racic ducts in 3 dogs and occluded the nortal vein in a 4th dog. They damaged the pan creas in these dogs by the injection of o r to A cubic centimeters of bile into the pancreatic duct They then determined the amylase and lipase activity in the peripheral blood the portal blood and the lymph They concluded that the main pathway of pancreatic ensymes into the peripheral blood following injury to the pancreas is by way of the portal vein and to a lesser extent by inflow of enzymes by the lymph of the thoracic duct Their findings are corroborated clinically by cases Nos 73653 and 74118 and the slight increased blood amyl ase activity found with blockage of the lymphatic system and case No 76131 with superior mesenteric vein and portal vein thrombosis (reported in detail in the fore part of this paper) and its accompanying marked increase in blood amylase activity

From the foregoing one can readily under stand how necessary it is to study the history and clinical findings in each case in order to evaluate properly the blood amylase activity found There were 2 cases of pneumonitis second ary to serious cardiovascular disease in group 3 These were Case D M and No 80232

Case D M a well known surgeon in our community became ill suddenly in 1941. The principal manifestations were pain in the right chest severe epigastric pain, nauses and vomiting The patient had had some form of intestinal surgery several years before and this was followed by an incisional hernia Consultations were held Roentgenograms of the chest disclosed a right lower lobe pneumonitis The attending physicians thought that he might be suffering from either high intestinal obstruction or acute pancreatitis A blood amplace activity test was ordered. Especial care was used in this instance because it was our first serious case in which the cuprous oxide precipitation method was being tried. It was found to be slightly increased (21/2 plus) It was my opinion, given at that time that this finding was not compatible with an acute pancreatite but could be compatible with either a pneumonitis or a high in testinal obstruction. The patient's symptoms cleared, and subsequently it was discovered that the patient had a thoracic encuryam. The patient died suddenly a years later when the aneuryam ruptured.

Since acute pancreatitis may simulate coronary thrombosis case No 80232 merits at tention

The patient, a white male aged 52 years was admitted December 22 1914, and expired January 6 1045 There was no necropsy The important manifestations were severe precordial and abdominal pain, dyspnes, pallor abdominal distention. The final diagnosis was coronary thrombook with myocardal infarction, but a progress note made the day before the patient died is of interest January 5, 1945 The first impression was that of myocardial infarction in a heart that already had one incident of thrombous several years ago. There are several inconsistencies to be explained (1) Marked ileus (this was present throughout the entire filmess and was refractory to treatment) (2) involvement of the upper lobes of both lungs when one expects the lower lobes to be involved in a beart case (3) bizarre x my of the chest exhibiting multiple small deposits throughout both lungs (4) thick bloody sputum from which were obtained pneumococcus type III Staphylococcus albus and Streptococcus hemolyticus The x-ray findings are not those of pneu monia or infarct, rather they suggest the possibility of carcinosis of the lungs.

It is my opinion that the slightly increased blood amylase activity in this case was due to the superimposed pneumonitis. Increased blood amylase activity in pneumonis has been reported (12 14 15) The mechanism is difficult to explain but the following factors

alone or in combination may act to produce this effect in pneumonia (1) The pneu mococcus capsule is a polysacchande. It is conceivable that this substance which has been labelled SSS' (specific soluble substance) may call forth an added amount of amylase in the blood stream. I was unable to prove this (14) (2) There may be pressure by the congested lungs upon the thoracic lymph duct and this may increase the blood amylase activity (3) The infection itself may involve other organs so that it is conceivable that in pneumonia we may have a mild pan creatic edema which in turn will increase blood amylase activity. The fact remains that in 2 of every 3 cases an increased blood amylase activity was found in pneumonia (14)

Case 70086 with a diagnosm of toxic nodular goiter and diabetes mellitus is of interest be cause Bartlett has reported a decreased blood amylase activity in thyrotoxicosis, and he believes that such a decrease is indicative of liver damage This one case showed a slightly increased blood amylase activity the test being run off with a water control (16) because of the associated diabetes mellitus. Among the many laboratory findings were two basal metabolic rates of plus 70 per cent and plus 92 per cent Suffice it to state that I am not sure how wise it is to draw any con clusions from blood amylase activity in thy rold disease The experimental work of Cope and associates on dogs and rabbits produced variations in serum amylase which were not consistent

Nothing can be said about case No 80300 a white female aged 56 who was admitted December 28 1944 and who agned her own release January 5 1945. Her unportain manifestations were diffuse vague abdominal pain vomiting tenderness over the entire abdomen without rigidity more pronounced in the right hypochondrium. Her blood Wassermann was positive Her blood amylase activity was slightly increased.

In summing up this analysis of the 9 cases of group 3 in which a slightly increased blood amylase activity was found it appears and to state that the pancreas is only secondarily and mildly involved in certain clinical enti-

ties. In cases in which it is doubtful as to whether or not the pancreas represents the principal seat of pathology blood amylase activity determinations should be made re peatedly every day or every other day. Or dinarily a careful analysis of the clinical and laboratory findings will lead one to a correct diagnosis.

Group 4 In group 4 there were 7 cases with moderately increased (3 plus) blood anylase activity. These 7 cases represent 10 1 per cent of the 69 patients observed. In everyone of the 7 cases the pancreas appeared to be involved. This was proved in 3 instances case Nos 72495 70855, and 82077 which are reported in detail in the fore part of this paper. I was unable to trace Cases F. F. and F. S. so I have considered them as not proved.

Case No 79627 was studied carefully and a final diagnosis of duodenal ulcer proved by z ray and other acceptable criteria, was made Because of the close proximity of the duodenal lesion to the pancreas one should not be surprised to find pancreatitis associated with duodenal ulcer This patient improved on conservative treatment and her blood amylase activity was then found to be normal. This case and case No 78148 m group 5 tend to corroborate the findings of Probatein Wheeler and Gray and those of Goyena and Cipolla who reported increased blood amylase activity in gastroduodenal ulcers. Probstein et al found blood amylase activity normal or subnormal when the lesion was on the anterior wall of the stomach, moderately elevated when it was on the posterior wall of the stom ach. They believe that such findings are of value in differentiating such lesions from acute pancreatitis. On the other hand Hinton found blood amylase activity determinations of little value in 40 cases of peptic ulcer and Lewison found the blood amylase activity elevated in only 2 of 25 cases of peptic ulcer

Case No 7,4856 a white male, aged 71 years was admitted October 2, 1043 and descharged October 6 1943 improved. The chief manifestations were severe abdominal cramps associated with diarrhea. The onset was sudden, at 200 a m. October 1 2943 He went to work but had to call a physician at 920 a m. He was sent to the hospital for observation There was no history of previous medical or surgical disease. On physical examination his temperature

ranged between 101 and 103 degrees F (38 3 30.4°C). There was marked abdominal tenderness and spasticity in the epigastric and left hypochon drise areas. The clinical impression was acute pan creatitis or perforated viscus. X ray examination of the abdomen revealed no evidence of intestinal obstruction or ruptured viscus. The blood amylass activity was moderately increased on October 2 (the day of admission), and it was again found moder ately increased 3 days later. The patient improved on conservative therapy and was discharged October 6, 1943, 4 days after admission with a final clinical diagnosis of acute pancreatity.

Of the 3 proved cases of pancreatitis (case Nos. 72495, 79855 and 82077) 2 died We are thus left with the impression that a moder ate increase in blood amylase activity may be associated with a serious prognosis. One should not be surprised that a greater blood amylase activity is not found in acute hemor rhagic pancreatitis. In case No 79855 there was grossly no viable pancreatic tissue left. In case No 73196 group 5 only the head of the pancreas exhibited viable pancreatic tissue (see Fig 2)

The study of these 7 cases in group 4 has led me to believe that a moderate blood amylase activity is almost always associated with pancreatitis of serious import and should be so considered until proved other

wise

Group 5 In group 5 there were 9 cases with markedly increased (3½ to 4 plus) blood anylase activity (13 1 per cent of the 60 pa tients observed) Four of these cases (Nos 73196 76131 76645 and 364105) reported in detail in the fore part of this paper were proved at operation or at necronsy

Case No 74626 was a white male aged 57 years, who was admitted September 9 1943 with a chief complaint of pain in the right upper quadrant associated with vomiting. He had had a cholecystectomy a vera before and was well until the sudden onset of his present illness. His abdomen was very much directed and there were marked tenderness and spaticity in the right upper quadrant. A clinical dispensis of intentinal obstruction was made. The patient signed his own release the same day but was readmitted the following day September 10, 1943 with the same complaints plus intense leterus Among the laboratory Indiangs was found a marked fineress in 860cd amyloze attrify A dilagnosis of acute pancreatith was made and the patient improved under conservative therapy. Three days later his 860cd amyloze activity was normal (2 plus). The following day September 14 the 860cd amyloze activity was normal (2 plus).

activity was alightly increased. On September 17, the patient had another bout of abdominal pain and wonliting and on that day the blood ossylass activity was found moderately (5 plus) increased. The patient improved again under conservative treatment

and signed his own release on September 20, 1943. This case demonstrated how well the blood amylase activity parallels the clinical course of acute pancreatitis. There is little doubt in my mind that this was a true case of acute pancreatitis though I have recorded it as an unproved case because operation was not per formed and the pancreas, for that reason was not actually visualized.

Case No 75622 a white female, aged 66, was admitted December 1 1943 and discharged December 23 1043 improved. Her chief complaint on admission was pain in the stomach for a weeks and womit ing for the past a days. With the onset of the abdominal pain she suffered a right-sided hemiplegia and developed a severe headache. Her past history disclosed that she had had an attack of gall-bladder colic 6 years before. Otherwise her health had been good On physical examination her tempera ture was 100 degrees F (37 8° C.), pulse 108 respira-tions 24 blood pressure 180 millimeters mercury vestolic, 80 millimeters mercury diastolic. Her abdomen was tender in the right upper quadrant. The liver could be palpated a handbreadth below the costal margin. Both lower extremities exhibited ulcers. The reflexes on the right side were hyper active. The laboratory findings were as follows Urine specific gravity 1.019 albumin, negative, sugar 3 plus a few white blood cells no red blood cells no casts, acetone, negative. Interes index was so cholesterol 235 milligrams per cent white blood cells 11,800, with polymorphonuclear leucocytes 76 per cent, lymphocytes so per cent mononuclear eucocytes a per cent blood sugar s10 milligrams per cent blood amplace activity markedly (4 plus) increased For one reason or another no attention was paid to the blood amplace activity and a clinical diagnosis was made of acute cholecystitis mild apoplexy and diabetes mellitus. The patient was treated conservatively though the surgeon who was called in consultation recommended cholecystec tomy his diagnoris being cholecystitis. The patient was discharged, improved, without operation December 22 1041

In reviewing this case I cannot escape the impression that the patient a chief complaints were due in part at least, to acute pancreatitis. And I am forced to conclude that a marked degree of blood amylase activity increase is not necessarily related to a senous prognosis. The chinical status of the patient is a far better guide to prognosis.

Case No 76140 is of interest because the blood amylase activity determinations were made twice on the 7th and 8th days post operative to see what it would show. On both occasions the Nood amylase activity was markedly (3½ plus) increased. The operation was performed January 20 1044 and consisted of a gastrectomy and splenectomy. The patient developed pneumona and anuria and expired on January 28 1044 8 days after operation.

The patient in this case was a white male aged 53 years who had had atomach trouble for the previous a years and had lost a 5 pounds (11-4 kgm.) in that time. His previous health had been good. The physical examination among other things disclosed a hard nothlar mass in the epigatrium, a mitral systolic murmur and marked varicosities in the left positived (one.

At operation the stomach had to be shaved away from the pancreas to which it was strongly adherent. Bleeding occurred at the lower pole of the spicen and it was deemed necessary to remove the spicen along with the stomach.

In reviewing this case one regrets that a blood anylase activity determination was nable of anylase activity determination was not made prior to operation. So many possibil ities present themselves in this case as a cause for the increased blood anylase activity after operation that any one or combination of the following factors could easily have been the responsible factor (a) injury to the pan creas and spleen (11). (b) the postoperative pneumona (c) the anuma. There was no necropsy. The pathologic diagnosis (by Dr. A. J. Gitlitz) was infiltrating adenocolloid carcinoma of the stomach with carcinomatous lymphangatts and lymph node metastases mild toxic sobeluits.

The seventh case in group 5 a white male aged 5 was admitted three times in 1944 (history Nos 77700 78000 and 19701). On first admission, May 7 1044, the patient had an incarcerated right inguinal hernia, which was operated upon the same day and be was discharged, recovered, June 18, 1944. On second admission 4 days later, June 8, 1944, he came with a chief complaint of right upper quadrant pain and letterus. An electrocardiogram showed por evidence of a heart lesion and an x-ray film of heart and lungs revealed no lung pathology. The heart was considered normal in size and configuration. The blood awgluss activity the day after this admission, June 10, 1944, was sacrkedly (a Hau) increased. He was treated conservatively and discharged improved July 1: 1944 with a final dag

nosis of acute pancreatitis. On third admission. September 24 1944, a diagnosis of arteriosclerotic heart disease was made. He expired October 27, injection showed no evidence of bronchlectasis. The right dome of the diaphragm was elevated and there was air between the liver and the diaphragm Examination of the esophagus showed a filling defect at the level of the arch of the aorta and a dilatation proximal to this point Below the filling defect there was a constriction and the barium trickled slowly past this area. Exophagoscopy was performed by Dr L. Markowitz, and a portion of the lesion was obtained for biopsy October 24 1944 The pathologic report was squamous cell carcinoma with pearl formation. The patient expired October 27 1014. There was no necropsy

It is my conviction that on the second ad mission of this patient the diagnosis was acute pancreatitis. I have not considered this a proved case because neither operation nor necropsy was performed and the pancreas for those reasons was not visualized. Once again we note that a marked blood amylase activity need not necessarily spell a serious prognosis with regard to acute pancreatitis. It is the clinical status of the patient, rather than the laboratory aid that is the surest guide to prognosis.

Case No 78148 in group 5 a white male aged 64 years was admitted June 21 1044, and discharged July 6 1944 improved. His chief complaint was right upper quadrant pain which radiated to the left across the abdomen. The pain was of 8 weeks duration. His temperature ranged between 08 6 and 100.6 degrees F (170 and 181 C.) pulse 68 to 100 respirations 20 to 24. The laboratory work up included the following gastrointestinal x ray revealed duodenal ulcer. The white blood cells numbered 14,050 with stab forms 6 per cent, poly morphonucleur leucocytes 60 per cent, lymphocytes 33 per cent, monocytes i per cent, hemoglobin was 16 5 grams per cent Red blood cells numbered 5 220,000. Blood sugar was 500 milligrams per cent nonprotein nitrogen was 26 grams per cent. Urme showed specific gravity rate albumin negative sugar 3 plus acetone a trace an occasional white blood cell no red blood cells casts none The blood amylese actually was markedly (4 plus) increased The nationt was treated conservatively by means of a diabetic diet and the injection of protamine sinc imulinate He improved and was ducharged July

Since a water control (16) was not run when the blood amylase activity was deter mined it is not known how much of the cuprous oxide precipitation was due to the high blood sugar. Experience has taught that a marked blood amplace activity in diabet. mellitus is not entirely due to the free bloosugar when the cuprous oxide prempitation method is used. In this case there was a proved duodenal ulcer and it is likely that the abdommal pain was due to a mild pancreatitis induced by the nearby duodenal lesion However one can only speculate about this in this case since a water control was not run to determine how much of the cuprous oxide precipitation was due to the free blood sugar in this severe diabetic. Govern and Cipolla and others have shown that there is an in creased blood amylase activity in some cases of duodenal ulcer Our 2 cases case No 79627 group 4 and case No 78148 group 5 tend to corroborate these findings.

In summing up on group 5 the conclusion is arrived at that a marked blood amylase activity always indicates involvement of the pancreas but that it does not always indicate that the pancreas is the main seat of the pathology. The outstanding exceptions were in the case of superior mesenteric vein and portal vein thrombosis in duodenal ulcer and in carcinoms of the stomach where the lesion is on the postenor wall adherent to the pan creas. Of the 3 proved cases in which the pancreas was the main seat of the pathology only I died. We are thus reminded that a marked blood amylase activity in acute pan creatitis does not necessarily mean a serious DF02730515.

In Table I 6 cases of pancreatitis proved at operation or at necropsy have been grouped in order to emphasize the fact that the introduc tion of a laboratory aid such as the cuprous oxide precipitation test for the determination of blood amylase is fraught with difficulties In Cases 1 and 4 of this table the test was run after operation ofter the diagnosis was established. This sort of finding is always anticlimactic. In Case 2 a normal blood amvlase activity was found and subsequent operation showed the presence of pancreatitus. This to say the least, is always disappointing in spite of the fact that it is well known that blood amylase tends to decrease to normal when pancreatitis is subsiding and does so rapidly

In 3 cases the blood amylase activity was determined before operation or before nec

TABLE II -THE PRINCIPAL PATHOLOGY AND BLOOD ANYLASE ACTIVITY IN 60 CASES

		Blood saryings activity				
Principal pathology	N d	Normal	D+ steme	ria-		
Pancres				п		
Call blockler	1	20		4		
Controlatertinel	ró			4		
Retroperkturen) and martranic	+			3		
Aortic annuyra						
Thyreid						
Live	•	7				
Eldneys	,	3	1			
Polymentry taberculosis	1		4			
Macellaneous	,					
Tetal	4	37	7			
	-	- 06	- m	201		

ropsy and in all 3 (cases Nos. 3 5 and 6) pancreatitis was found.

Two conclusions have been drawn from this study (1) When increased blood amylase activity is found pancreatitis should be deemed to exist unless proved otherwise (2) if one is to make a correct diagnosis of pancreatitis before operation or before nec ropsy one must be pancreatic disease con scious.

In Table II are given the principal path ology and blood amylase activity in 69 patients. A study of this table has led to the conclusion that multiple pathology is the rule rather than the exception when pancreatits is part of the picture. In 25 cases (36 3%) there was an increased blood amylase activity. In 7 cases (28% of the 25 10% of the entire series of 69 cases) the pancreas was the principal seat of pathology as proved at operation or by necroosy.

In only i case (23%) of the 44 cases in which the blood amylase activity was normal or decreased was a proved pancreatins found. Thus again I am forced to conclude that a normal or decreased blood amylase activity tends to rule out pancreatitis or that, when it is thought to be present then it is subadding or has subsided. By the same token, when ever an increased blood amylase activity a found pancreatitis should be deemed to exist

unless proved otherwise A careful evaluation of all the facts will most surely lead to a cor rect diagnosis.

In estimating the number of cases in which the test was used to include or exclude pen creatitis the 5 cases of tuberculosis and the 1 case of toxic nodular gotter were not counted. Thus there were 63 cases in which it was sought to include or exclude pancreatitis. Of these a clinical diagnosus of pancreatitis was made in 12 (19%) cases of which 7 (11%) were proved at the time of operation or necessary.

This is againfroant. It implies that every patient with upper abdominal pain must be considered suspect with regard to pancreatitis. If one keeps pancreatitis in mind at least 11 proved cases of pancreatitis may be discovered in every 100 patients with upper abdominal pain. And the more cases of pancreatitis that are found the better will be our treatment the better will be our results.

Of the 6 proved cases of pancreatitis 3 patents (50%) ded. Of these 2 cases were fulminating affairs. As one reviews the histories in these cases the impression is gained that time is lost in making an accurate diag moss and that there is as yet no set plan of treatment which has been found uniformly effective. Reflection upon this leads me to suggest that a 'pancreatitis team' be formed in each hospital to cope with this problem and that there he a central 'pancreatitis registry' where all proved cases of pancreatitis could be filed and made available for study and evaluation of the manifold phases of this

truly serious disease. With the advent of penicillin it is likely that more patients with acute pancreatitis will recover if the diagnoss is made early. But, in the presence of acute hemorrhage pan creatitis or pancreatic necrosis, it strikes me that only a careful combination of medical and surgical treatment will cut down the mor tality rate. I feel reasonably certain that the hospital staff that is pancreate disease conscous will produce the best end-results.

In the following tabulation have been in cluded the clinical entities in which blood amylase activity has been found to be in creased or decreased

#### Increased

- Acute pancreatitis, trauma
   of the pancreas and spicen,
   pancreatic collections (pseudocysta)
   Pacumonia, in a out of
- every 3 cases
  3 Perforation of peptic ulcer
- into or near the pancreas

  Duodenal ulcer
- High intestinal obstruction
   Salivary duct occlusion, suppuration, or mumps
   Impaired renal function
- 8 Superior mesenteric vein and portal vein thrombosis o Common bile duct obstruc
- to Adenocarcinoma of the gull bladder
- II Toxic nodular goiter
- 13 Mesenteric cyst 13 Retroperitoreal metastases
- 14 Ancuryan of thoracic aorta 15 Adrenal insufficiency in the dog

#### Decreased

- Pernicious anemia
   Pneumonia and other infections
- 3 Obstructive faundice 4 Primary and second ary malignancy of the liver and bile ducts
- 5 Impaired renal function where there is a great loss of albumin
- great loss of albumin 6 Diabetes mellitus 7 Toxemia of preg
- nancy
  8 Drug poisoning
  9 Burns, with liver
  and loss of plasma
- protein
  10 Acute alcoholic state
  of the chronic alco-
- II Hyperthyroidism with impaired liver function
- 12 Tuberculosis
- 13 Hemorrhagic shock 14 Perforation of peptic ulcer anterior gastric wall

By and large a careful analysis of any given case will lead one to a correct diagnosis if one keeps pancreatitis in mind Just the mere fact of thinking about pancreatitis is almost mitself sufficient. The laboratory aids are helpful, mdeed, but one should not readily discard his years of clinical experience when a laboratory aid fails to corroborate a clinical impression.

#### GENERAL COMMENTS

At the beginning of this article it was stated that blood amylase activity determinations have been used with increasing success at our hospital for over 4 years. The cuprous onde precipitation test itself is truly reliable but its successful evaluation varied at first for one or more of the following reasons

1 Difficulty was encountered in making the medical staff pancreatic disease conscious. Now however after 4 years the test is being ordered with fair regularity in cases characterized by upper abdominal distress. The greatest comfort is derived when the report is normal or decreased blood amylase activity

2 Difficulty was encountered in getting the medical staff to realize that while an in creased blood amylase activity nearly always implied pathologic involvement of the pan creas it did not always imply that the principal pathology lay within the pancreas. Thus a marked increase in blood amylase activity has been reported in the pneumonias (12 14 15) in duodenal ulcer (6 18), in acute trauma of the spleen (11) and in mesenteric vein and portal vein thrombosis reported herein. A careful evaluation of the history and physical findings in each case will almost always lead one to a correct diagnosis

3 Difficulty was encountered in gaining the confidence of the staff in a gross evaluation of blood amylase activity in terms of normal increased decreased or by plus and minus signs. In another article (14) I have gone at length into my reasons for adopting a gross measure of amylase activity. Suffice it to state that after having performed this test more than 500 times, I am more than ever convinced that measurement of blood amylase activity by means of cuprous oxide precipitation is a quick simple and reliable method. Anyone may perform the test. It does not take highly trained technicians and it requires only the simplest of apparatus.

#### SUMMARY

Moderate to marked blood amylase activity is almost always associated with disease of the pancreas.

2 Normal or decreased blood amylase activity almost always excludes pancreatitis. Where pancreatitis exists in conjunction with a normal or decreased blood amylase activity it may be safely assumed if the clinical status of the patient bears it out that the pancreatitis has subsided or is subsiding

3 A slightly increased blood anylase activity may be safely regarded as indicating pancreatic involvement secondary to prin cipal pathology elsewhere. When in doubt, tests should be repeated every day or every other day if the condition of the patient permits.

4 The presence of multiple pathology is the rule rather than the exception in acute pancreatitis Biliary tract disease is the commonest complicating factor in this respect An attack of acute pancreatitis may be the first clinical sign of the presence of biliary

# AMINO ACIDS IN THERAPY OF DISEASE

# Parenteral and Oral Administrations Compared

S C MADDEN M D S H. BASSETT M.D J H REMINGTON M D F J C MARTIN M D., R. R WOODS M.D. and F W SHULL, M D.

MINO acids were tested for their value in the treatment of human disease in the observations presented in this paper Certain mixtures of those amino acids reported essential for the growth of rats (25) together with the amino acid gly cane were given over long periods of time either parenterally or orally Parenterally they were of considerable value (Tables I and III) providing nitrogen balance weight gain and clinical improvement. Similar benefit has been previously shown in man (4) and in dogs (17 20) Orally they maintained nitrogen balance (Table II) but in the I patient studied they were not quite so well utilized as were natural food proteins.

Nitrogen balance with 8 amino acids has been obtained in normal human beings (26) These 8 are threonine value leucine isoleu cme lysine tryptophane phenylalanine and methionine The mixtures used in the obser vations of this paper contain in addition to these 8 amino acids histidine arginine and glycine It appears in Table I that histidine may be required for nitrogen balance in a pa tient with chronic ulcerative colitis In nor mal man histidine has been omitted and nitrogen balance maintained (26 2)

Parenteral nitrogen feeding in man was first successfully reported only 6 years ago (12) Parenteral feeding is indicated and im portant in treatment when feeding by the gastrointestinal route is impossible or inadvisable. A very high protein intake with its beneficial results such as obtained by natural diet in the patient of Table IV would be very difficult of achievement by wholly parenteral means. Nor should it be attempted until real efforts to improve the oral intake have failed

Complete and successful parenteral admini tration of protein nitrogen, fat, carbohydrat and accessories has been achieved in man (8

The studies here involving parenteral feed ing were not intended to provide complete nutrition parenterally It was desired to tes amino acid mixtures given parenterally while optumum quantities of nonprotein dictary constituents were given orally. In most of the observations given in Tables I to III there was some protein present in the diet but in 2 periods presented in Table III the intake was almost exclusively from amino acids.

# GENERAL WATERIALS AND WETHODS

All metabolism studies were made with the patient in the metabolism division except for the study presented in Table II Food and fluid net intakes were carefully weighed or measured and their nitrogen contents calcu lated from standard reference tables nitrogen content of some of the diets as noted in the clinical histories was checked by Kjel dahl analysis of a complete day s intake All urine feces and vomitus were saved for analysis Stool collection periods were marked by tomato seeds given on the first day of the period Total nitrogen was done by macro kjeldahl procedure and urea plus ammonia nitrogen by the method of Van Slyke and Kugel. The patients were weighed under uniform conditions on a special balance and weights at ends of periods noted (see tables)

The amino acid mixiures were somewhat similar to those used in the first patient (4) Mixture designated vuj contained in grams per 100 gram dl threonine 10.8 dl valine 13.8 1()-leucine 15.4 dl isoleucine 108 1(+)lyane. HCl H<sub>2</sub>O 12 3 dl tryptophane 1 8 dl-pheny lalanine 6 9 dl-methionine 6 2 1(+) histique HCl H<sub>2</sub>O<sub>4</sub> 1(+)-arginine HCl 8

From the Departments of Pathology and Medicine, the Uni-resity of Rochester School of Medicine and Dentistry

glycine to nitrogen content 13 6 per cent by calculation 13 3 per cent by Kjeldahl Mix ture vuk is vuj with the 1/-leucine replaced by the same amount of dl leucine. Mixture vu consists of dl threonine 7 dl vallier 11 dl leucine 18 dl isoleucine 12 1(+)-lysine. HCl H<sub>2</sub>O 12 1()-tryptophane 4, dl-phenylalanine 12 dl-methionine 6 1(+)-histidine HCl H<sub>2</sub>O 4 1(+)-arginine. HCl 7 glycine 7 nitrogen by calculation 13 1 per cent. Mixture vua 18 vu with the dl-leucine replaced by 1(-)-leucine 9 gm. Mixture vub is vua with the phenyla lange regions of 3 m. Mixture vub is vua with the phenyla lange regions of 3 m. Mixture vub is vua with the phenyla lange regions.

The amino acids were dissolved in distilled water just below the boiling point, filtered, and autoclaved for 15 minutes at 15 pounds pressure. The solutions were water clear often faintly yellowish after autoclaving

They were acid, about pH 5 except as noted. The amino acids were given intravenously or subcutaneously in 6 to 13 per cent concentration. The concentration and volume of each injection was measured and any small quantities not given because of incomplete drainage of tube or flask were deducted. The vij vua, and vub mixtures were usually given in 10 per cent concentration. Mixtures vak and vu were given usually in 7 per cent solution. The solubility of the different mixtures has largely determined the concentration employed.

#### ANALYSIS OF DATA

The observations recorded in Table I represent an almost perfect metabolism study of 100 days duration. The patient was intelligent and co-operative, and except for the loss of the fecal output of period 15 the measurements of introgen intake and output were complete.

Nitrogen balance and considerable weight gain were obtained duning 8s days (periods to 18) when amino acids furnished the bulk of the nitrogen intake—8s to 93 per cent except for periods 3 and 4 of about 80 per cent. Synthetic mixtures of the 10 amino acids essential for the growth of rats (2s) and glycune provided this introgen, except for period 3 when the protein hydrolysate amigen was given These amino acid mixtures included unnatural isomers of threonine, valine isoleuone, trypioner.

tophane phenylalanine and methionine, and in mixture vuk leucine. No toxicity to there unnatural isomers was detected. The amino acid mixtures of period 2 produced clinical disturbances, and nitrogen balance was not obtained (Case r first study Table I) Amigen in period a however was well utilized and well tolerated at injection rates below to milligrams nitrogen per kilogram per minute. In perioda the mixture volwas numberly utilized and tolerated. It should be noted that the urmary nitrogen partition is the same with this mixture containing unnatural isomers as with amiren. With either material the un determined fraction is higher than with oral feeding of natural protein (compare with period 1) A similar difference between intra venous and oral administration of digests to

dogs has been found (19)

The oral feeding periods 12 to 14 are of much interest. Nitrogen retention was considerably greater than in the injection periods. This retention was associated with a reduction in the urea and ammonia nitrogen of the urine. In contrast to the observations in dogs (19) there was no decline in the undetermined urinary nitrogen. A rise in feed nitrogen in periods 12 and 13 tapered off in period 14. An increase in the number of bowel movements also occurred and as detailed in the case report, the number did not return to the pre-

vious level until period 17

Tolerance was good but not strikingly greater for mixture vij than for amigen in this patient. Better tolerance for other mixtures of amigos cods was found in the observations of Table III and in the earlier report in man (4) Better tolerance for other mixtures has also been found in dogs (21 18) In period to two of the intravenous injections were made in 13 per cent concentration, both without reaction or vein injury the nitrogen rates, however were only 7.8 milligram per kilogram per minute.

The improved tolerance of the mixture without phenylclastins is quite definite in this patient, as described in Case r Table I periods 6 and 7 Omission of histidine, argunice, lyaine, or methionine was without noticeable effect on tolerance. Subculancens injection of the amino add mixture in 10 per

## TABLE I.—AMINO ACIDS PARENTERALLY WITH NITROGEN BALANCE, WEIGHT GAIN AND CLINICAL IMPROVEMENT

M. E., aged s6 years, chronic alcorative colitie

-				*****					
Period	1		en intake period	Nitrogra cetpet per period				1	
1 471	Andreo ecids	Food	Amino ackla	Urine total	Urine res- NH <sub>1</sub>	Urine mode- terrorised	Feces	Mitregen balance per period	1 North
		Gruns	Grauss	Granu	Per cent	Grama	Grams	Grams	Kilograms
	None	1	1	40-5	8	93	307	+ :	\$2.00
	Varios, i.	0.5	65	68.3	,	10	#ú s	-101	50.13
	Amigen, Lv	5	6.6	56 6	67	169	1	+6.7	n 61
4	Velly	15	399	\$5.7	60	7-4	14.7	+47	#
- 1	I LL sc	7.5	0#	93.4	73	5-5	87	- 6	1 14
- 6	Vite c	40	856	824	69	L3	136	+3-5	34-43
	Vul. 1	1	84	80.9	70	24	0	+6.0	1141
	Vuk, Lv	7.4	850	76	63	45	110	+1	H 6)
•	Vak, i.	60	43	44 3	•	7.3	47	-8	55 9
	Vul.Ly	6.0	43	37	60	140	ı, i	-0 E	37 P
	Yali c	60	43-3	55 4	65	3.8	13	+0.1	<b>5</b> \$ 0
	Vak, oral	60	433	5	40	7	17	+3	43 8
	Vak, oral	00	43.3	87.7	49	14	4	+04	<b>50 00</b>
- 4	Vak, oral	60	41	17-4	45	141	rud l	+0	50 63
	Vet, Ly	60	43.3	3L	63	14	last		50 p3
r6	Vak telese histidine i.v	60	407	37-8	63	23.0	5	-1.2	60 78
17	Vuk salosa kietidine Lv	60	40.7	41	66		,	-5	6 17
	Yek,1	6.	43	36	6	-		+ 4	6 3
19	None	70 \$		6 7	B5		7.5	+32.3	6 50
	None	01.5		69	\$7		3	+ 3	6,

cent concentration during periods 5 6 and 11 produced no disturbance and utilization was equal to that following intravenous injection (compare periods 10 and 11) It should be noted that this patient was an ambulatory sensitive individual to whom these hypodermoclyses were no more uncomfortable than if physiological saline solution were being injected.

Improvement in clinical condition was evident by period 3 and continued throughout the study. The underlying disease was by no means cured but its signs and symptoms were greatly alleviated. The number of bowel movements declined from 5 to 6 daily to 3 daily after only 5 days of parenteral nitrogen leeding. They were reduced to only 1 daily after period 6 Marked reduction of fecal nitrogen output was of equal interest (compare

periods 1 and 6) Symptoms of abdominal distention also disappeared. Similar clinical improvement has been observed in another patient with chronic ulcerative colitis when given amigen intravenously and a high carbohydrate low protein diet orally. Some of the clinical improvement in these cases may be due to the mental comfort of 'special treat ment, but probably not all of it.

Omission of histidine was associated during the second 5 days (period 17) with a rise in urinary nutrogen. Nitrogen balance was negative but it should be noted that nitrogen intake was less by the amount of the histidine nitrogen. We believe however that the rise in urinary nitrogen during histidine omission and its prompt return to the previous level upon histidine replacement indicates a requirement for histidine by this patient

Weight increased steadily particularly after period 7 and even during histidline omission. Nitrogen retention over the entire period of amino acid administration does not total enough to account for the large gain. Deposit of fat probably explains most of the increase Weight increase continued without interruption when a natural diet was given during periods 19 and 20 now with large deposits of introgen, and the reduction in undetermined urinary nitrogen was striking

CASE : First study M E. (SMH 203 158) was a 26 year old white painter with ulcerative colitis of 6 months duration when the observations presented in Table I began. Two months previously he had left the hospital after a stay of 6 weeks. During this first admission no cause could be found for the colitis. Upon fluoroscopy the colon appeared large and its wall smooth. Upon sigmoidoscopy it showed many fine bleeding points but no distinct ulceration. Stools were 7 to 8 daily a reddish liquid, half red blood cells and half leucocytes upon interesconic examination, but during bed rest, high protein and vitamin intakes, blood transfusions, and sulfasucci-ding therapy the number of bowel movements decreased to 3 to 4 per day. Out of the hospital some of this improvement was lost and the weight had declined from 58 to 52 kilograms. Upon the present (second) hospital admission it was suggested that a very low residue diet might be advantageous. After 6 days of routine care in the hospital the patient was transferred to the metabolism division. He remained ambulatory on the division throughout his

In period 1 a soft "low residue diet of natural foods was consumed. It provided daily protein 127 grams and calories 3104. The same diet was eaten during the last 2 periods (19 and 20) but during the intervening 17 periods a very low protein diet was given. The low protein diet varied somewhat until the eighth period and thereafter remained fairly constant. For the 10 periods (0 to 18) it consisted in grams, of orange juice 400, grapefurit juice 200 lemon juice 70, currant jelly 50, gum drops 200 horcome 50, destrose 235 corn starch 500 taploca to, cocoa 5 butter fat 40 cresm (butter fat 36 per cent) 50, salt 1, baking powder 3 A corn starch-butter fat taploca "biscuit" was baked and corn starch-creamfruit juice puoddings were forsen. This diet contained by Kjeldahl analysis 138 grams nitrogen and a calculated 3 700 calories.

The actual caloric intake of the second period averaged 1971 including the amino acids and of periods 3 to 7 varied between 3,000 and 3,500 including the calories from the amino acids (calculated as altrogen X25) A vitamin B complex concentrate was given during the first 7 periods and thereafter a multiple vitamin emulsion (10 c.c. dally) described cleawhere (10) Sulfauscidde 12 grams, ferrous

sulfate o.s gram, and intramuscular liver carract (sunit per c.c.) suble centimeters were all given daily during periods 8 to so. On the bare possibility that insulin might encourage the appetite for the high carebolydrate diet to units was given 30 minutes before each meal beginning in period 8. The diet was fairly readily state.

During periods z to 18 amino acids were given as recorded in Table I They were injected twice daily through period 8 and once thereafter

In period a mixture wee (volb with di-tryptophane) was that given, 45 grams in 50 minutes, and the pa tient became nauscated. He vomited during the next injection of 55 grams. The vu mixture, used at rapid rates without reaction in the observations of Table III was then given, 50 grams in 100 minutes (1 s mgm. nitrogen per kilogram per minute) with out nausca and 16 5 minutes (1 s mgm. nitrogen per kilogram per minute) with nausca and vomiting. Masses twice and vomiting once occurred with 3 of

grams was deducted from the intake in Table I In period 3 antigen (in enzymatic digent) of casen and pork pancreas) in 5 per cent solution with 5 per cent destrose was used. A total of 10.43 liters was given in 10 injections, the injectious warying from 100 to 100 minutes in length. Only the one at 100 minutes (1 x mgm. nitrogen per kilogram per min ute) produced nauses.

the remaining 6 injections. Vomitus nitrogen 1 5

In period a mixture voj was given in approximately the same quantithes (in 65 to 100 minutes per injection) with manea on a occasions at 17 milli-grams nitrogen per kilogram per mionie. Destroes, 5 per cent, was included in the amino acid solution during the period for more exact comparison with the amigen of period 3. During periods 4 to 6, the amino acid solution was adjusted to a 94 to 65 by addition of sodium hydroxide—with no apparent effect on tolerance.

On each of the first 3 days of period 5 the large quantity of 105 grams vol mixture was given with vomiting during 9 of the 6 injections. Omission of pixee, birtidities and arginize cluring one of these did not prevent vomiting. The amount given was reduced to half on the last 2 days omission of methionine on 1 day did not prevent vomiting. These omissions of essential annino acids were associated with a weight loss from 5,112 kilograms at the beginning of the period to 5,118 kilograms at the end. Vomitus nitrogen of 3 5 grams was deducted from the intake in Table 1.

In periods 6 and 9 mirture val 65 grams, was injected twice daily usually once by ven and once subcutaneously. There was names on 3 consistons but usually so disturbance occurred when the rate was near 1 millipram altrogen per killogram per minute. On the last day of period 6 phenyialderias was omitted from both mjections (by ven). There was no reaction to the injections given in 95 and 55 minutes, respectively, 76 and 76 mgm, nitrogen per killogram per minute). The day's intake of benyialanine when started 45 minutes after com-

TABLE II -- AMINO ACIDS ORALLY COMPARED WITH AMIGEN AND WHOLF EGG
M. E., agrid of years, chronic alcurative collish

36.515		Nitrogen intake per period			Nitroger per p	{			
Period 10 days	Diet	Ambeo ectris	Basul	Urise total	Urbss sres-NH <sub>2</sub>	Urine ande- termined	Feces	Mitrogen balance per period	Weight
,	V 1	Cirams 85 6	Gramma S	Grants 8 3	Per cont	Grazes S	Grame 37 9	Grazza - 8 3	Ellograms 15 6
	Vul	\$5.6	3	53.3	65	8 6	15 7	+ 6	50 J
,	Val	86 6	5	¥	64	9.6	35.3	+	10 5
. 4	Anigra	90	3	47 7	75		4.3	+6	\$9.8
5	Amigra	196	3	6 0	78	14	65	+3	50 5
- 6	Equ		<b>8</b> 7.9	<b>40</b> 6	73	11	F7 6	- 1	£8 6

pletion of the second injection produced names at a rate of 0.6 milligram nitrogen per kilogram per minute.

When the mixture was given the next day (first day of period 7) with phenylalanine included vomit ing occurred at a total nitrogen rate of 17 milli grams per kilogram per minute phenylalanine nitrogen rate of o o8 milligram per kilogram per minute. The next day mixture vuj subcutaneously at 29 milligrams total nitrogen per kilogram per minute was followed by vomiting 45 minutes later When phenylalanine was again omitted on the third day of period 7 the two injections (4 hours apart) were given by vein at 4.3 and 3 r milligrams nitrogen per kilogram per minute without names or vomiting The phenylalanine given 30 minutes after the second injection produced vomiting at the nitrogen rate of as milligram per kilogram per minute when 108 milligrams phenylalanine nitrogen per kilogram had been injected. The next day no reaction occurred to the complete mixture at r r milligrams nitrogen per kilogram per minute, but 30 minutes after subcu taneous injection of the second dose at 3 6 milligrams nitrogen per kilogram per minute vomiting occurred The vomitus nitrogen for period 7 amounted to 2 07 grams.

In period 8 the mixture was changed to vuk at the same intake level as in periods 6 and 7 No nauses of voniting occurred at the slow of rates of 0 7 to 0 9 milligram nitrogen per kilogram per minute.

In periods 9 to 11 the amino acid intake level was reduced to half that of period 8 and injections were agaily at the same alow rates even when given sub-cutaneously (period 11). At the end of period 9 and during part of period 10 the patient had for 3 days a tore, red pharynx and fever to 39.5 degrees C. It builded.

mbidded uneventfully. Cultures were nonspecific. In periods 12 to 14 the amino acids were given by mouth, the to per cent solution being mixed in the fruit juices and frozen puddings. After the first 2 days the patient stated that the taste was not un pleasant.

In period 15 the stool collection was accidentally discarded Periods 16 to so were uneventful

The patient a symptoms of abdominal discomfort subsided entirely during the early periods. The number of bowle movements decreased sharply during periods 1 to 7 the numbers per period being 27 30 17 31 to 13 and 4, respectively. There was one stool a day during periods 8 to 11 but when the amino acids were given orally in periods 12 to 14 the amino acids were given orally in periods 12 to 14 the numbers per period were 10, 9 and 8 respectively. During periods 12 to 18 the number declined again 0 7 5 0 and in periods 13 and 20 on the same diet as period 1 were 3 only during each period. The stook did not become formed until the last two periods, and, although no blood or mucus was visible still did not appear normal

During the first 7 periods the plasma protein level rose from the region of 5 7 to the region of 5 3 grams per 100 cubic centimeters of plasma and remained there during the remaining periods except for dips to 8 during periods to and 11. The albumin spobulin ratio remained about 17 most of the time. The scrum nonprotein nitrogen chlorides, and plasma carbon dioxide combining power varied within nor mai ranges. The hemoglobin rose from 11 to 13 2 grams while the red cell count remained at 4 100 000

At the end of the study fluorescopy, showed im provement of the colon as compared with its appear ance at the beginning of the study. Sigmoidoscopy however still showed bleeding points and excessive secretion in a reddened edematous mucosa. No ulcers were seen. The patient was discarged to work as a hospital orderly to be kept under observation. Subjectively, and objectively he was tempor arily greatly improved (Case 1 Table II)

In Table II the effects on nitrogen metabol ism of giving amino acids and amigin by mouth are shown. The salutary effect on the symptoms of colitis in the observations of Table I suggested that an attempt to relieve these symptoms which had recurred should be made by oral administration of the amino acids. The symptoms were not relieved (Case

1 second study Table II) but the observa-

The amino acids appear in this instance to be better tolerated by the intestine than amigen but amigen appears better utilized upon absorption from the intestine. These factors combine to yield approximately the same net retention of introgen in periods 2 to 5. The negative balance of period 1 probably reflects the change from the higher level of nitrogen intake which probably preceded the relatively low level of negod 1.

The egg nitrogen of period 6 Table II is better utilized than either the amigen or the amino acids, as judged by the relation of intake to urnary output, but the loss through the intestine offsets this advantage.

The weight remained fairly constant through out the observations (Table II) The gain registered in Table I on similar intakes did not occur here probably partly because of in creased calone demand during activity out side of the hospital.

CASE I Second study M. E. (SMH sog 158) was the same patient studied in the observations recorded in Table I. He worked for I week upon discharge from the beopital, then his old symptoms began to return gradually. Within a week he was having 8 to 0 bowel movements a day and soon had an acute febrile exacertation. This gradually subsided during hospitalization and vigorous supportive therapy. During the first 2 months of this relapse his weight had declined to 4,7.6 kilograms but rose to 52 kilograms upon discharge from the hospital? weeks later During the next 2 months he gained weight desorie continuance of frequent loses stools.

As a co-operative out-patient he was easer to test the influence of the low residue diet again with amino acids by mouth, so that the conduct of the experiment was entirely satisfactory The amino acids were weighed in the laboratory and the basel diet was weighed on a special balance at home. The basal diet for the entire o periods was identical with that of periods 9 to 18 (Table I) except for omission of the cream and the cocos. It had a daily nitrogen content of o. c gram. The vitamin emulsion used was the same as that in the observations recorded in Table I. Urine was collected in a day periods under toluene with refrigeration, and analyzed the follow ing day Stools were collected in 10 day periods. The weight at the beginning of period 1 was 58 6 kilograms.

In periods : to 3 the amino acid mixture and the diet were completely consumed. Vomitus aftrogen the first day of period 1 was deducted from the take. The acids without methionise were fairly innocuous to the palate, so that the patient took the

methionine separately "as medicine," in divided doses to accommany the three media a day

In periods 4 and 5 migen powder was dissolved and suspended in the diet, 75 grams daily in period 4 and 150 grams in period 5 with 150 grams to the first day. It was tolerated although less paintable than the crystalline amino acids. An exacerbation of symptoms with abdominal pain and increased tenerums and bleeding occurred during the last 2 days of period 4 and the first of period 5. Sulfarsucedidne was then given for 5 days, and although the distribusion creased for 4 days the other symptoms unbidded

The symptoms of colitis continued without relief during the co days of these observations. In fact the number of bowel movements rose from 8 to 10 daily prior to period 1 to 11 to 4 daily during period 1 totalling 120. During periods 2 to 6 the totals were 93, 111 114, 145 and 124 respectively. The stools

contained much muchs, and frequently blood.

In period 6 the protein intake came from 1 pound of hera eggs daily (12 sources on the first day). The nitrogen of the total did cd 1 day was determined by Kjeldakh analysis. On the fourth day of the period the patient had a transient upset and vomitted once, nitrogen content 1 18 grams. He had lost his appetite for this stringent regumen by the close of the period and returned to his soft, more varied dict.

Table III further demonstrates the value in preoperative and postoperative care of paren teral feeding with anino acids. The patient JS with chrome intestinal obstruction was maintained in positive nitrogen belance by intravenous and subcutaneous injection of amino acids, despite an intercurrent acute in fection during periods 1 and 2 Moreover during period 1 the nitrogen intake was entirely from amino acids except for 0 6 gram on 1 day only

When no amino acids were given during period 4 the patient was unable to maintain adequate nutrition by mouth. Operation on the last day of this period corrected the obstruction (Cases 2 and 3 Table III)

Postoperatively J.S. (period 5) had an uncentful course and recovered rapidly. Nitrogen balance was maintained despite the serious injury of a major operation. The day by-day belances of period 5 if one assumes equel division of fecal nitrogen, were +3 o o4 19 +24, and +2 7grmms, respectively. This is not the usual postoperative course of the nitrogen balance (10, 7 15) but allowance must be made for the fact that the patient was emaciated. With zero intake of nitrogen the balance will obviously be negative in any case.

## TABLE III -AMINO ACIDS PARENTERALLA VIELD NITROCFN BALANCE AS SOLF SOURCE OF NITROGEN

J S aged 1 years, chronic listin

		Mitrogen intake per period			Mitrogra per p	Nitrogra			
Pried 5 days	Amina	Amino ecida	Basel	Urine Total	Udos mar-NH3	Urine unde- termined	Feces	Starogen belance* per period Grame +# 4 - 9 +# 0	Wetght
	\s_iv sc	Orazas No	Grams	Grane of 4	Per cent 57	Grams 44	Greats	Grame +0 4	Xllogram 33 o
	Va.ly ac	65	3.4	64.7	60	3 \$	5 6	- 0	1
			83	34	57	0	6	+4 0	32.0
	Ve.tv	01 3			26	5.4		1	37
4	Nexe(Operation)		0 5+					+53	-
1	Ve, ly	0 7	1		1 .	3 9			
	None		78 3	3 6	79	5.6			37
			H & ared s	THE PLANE	nouna of board of	режения			
	<del></del>			64 4	16	6 3	4.7	-14 8	60 4
	los, ir sc	20	L			16 7	63	~ 1	1
	Yarb. sc	58 B	į.	3 3	6.8	10 1		<del></del>	

<sup>&</sup>quot;Through of vonditon and Wangespiese dealings deducted

If the nutrition is relatively normal preopera unity the balance will be markedly negative postoperatively. If the patient is protein depleted before operation the negative balance is much less (6). With moderate caloric and protein (or amino acid equivalent) intake balance can be maintained in such depleted individuals, as demonstrated in the present initiance. Previously normal individuals require larger intakes of introgen, or possibly special kinds of introgen (18 9).

Patient HS Table III presented the difficult problem of nutrition in a jaundiced patient after a major operation. Anorems and romiting were severe and the superficial vens were very difficult to use for injections during the 10 days of study were made subcutane only Tolerance was good to the 10 per cent smino acids subcutaneously and on 2 occasions injections of more than 12 per cent concentration were given in period 2 without the slightest upset.

Nitrogen balance was approximated in the and period with patient H.S. Table III when the entire nitrogen intake was being provided by amino acids. The undetermined urinary nitrogen fraction was proportionately lower with mixtures vua and vub (as well as with vij Table I) than with vu This may be in direct evidence of poor utilization of the

unnatural d(+)-leucine contained in the vu mixture Some conversion of d(+)-leucine into the i() form occurs in rats (23)

CARE 2 JS (SMH 190 516) was a 21 year old, white college student with recurrent episodes of abdominal pain and vomiting during the past 7 years. He was emacated and pale, weight 35 5 kilograms, height 175 centimeters. He had never shaved but his sexual development appeared normal. Fluoroscopy following bardum showed several dilatations of lieum which were followed by an apparent obstruction.

To attempt to improve the condition of the patient before operation he was transferred to the metabol ism division 4 days prior to perfod 1 Table III for special diet control. Further oral feeding was tried the first 3 days on the metabolism division but vomitting of large amounts of fluid and food occurred every evening. The weight was raised to 37.4 killograms 2 days before period 1 began largely by retention of saline infusions. A Miller Abbott tube was passed into the jeinmum the day before period and distention was relieved but vomiting of ingested food and fluid persisted. An aphibous stomatical food and fluid persisted. In aphibous stomatical food and fluid persisted of the property of the day before the tube was passed and continued during periods 1 and 2.

and 3. In period 3 the amino acid mixture vu. 200 grams was given daily and the caloric and vitamin intakes were provided by a fortified lemonade and synthetic vitamins and concentrates. There was no clinical disturbance which could be attributed to the amino acids. Fever between 38 and 39 5 degrees C. accompanied the stomatitis and near the end of the period an area of patchs, density by x ray was found in the right lower lobe. Sulfadlazine was given with questionable benefit

The average daily caloric intake was 1,800. Other pertinent laboratory data were plasma protein 4.0 grams per 100 cubic centimeters plasma, nonprotein ultrogen 13 milligrams per 100 cubic centimeters serum chordes 107 milligrams per 100 cubic centimeters serum carboo dioxide combining power 41 volumes per 100 cubic centimeters plasma, nemoglobin 9.5 grams per 100 cubic centimeters blood, leucocyte count 8,000 per cubic millimeter blood. The nitrogen in the vomitus and Wangensteen drainage amounted to 1.0 srams.

In period 2 the amino ackl solution was modified on one day by addition of sodium carbonate of willum content chemically conivalent to the chloride content of the amino acids. The resulting solution had a reaction of \$11 8.45 and after subsulaneous injection of 100 grams amino acids in 1600 cubic centimeter solution the patient's thighs were sore and reddened and a small blister appeared at the site of the needle puncture. This irritation subsided without further progression. All other injections at the usual acid pH 5 produced no disturbance. The daily food and amino acid intake averaged ; for calories. The small amount of protein came from a processed vecetable soun butter and cream and tapioca. The remaining diet consisted of fruit fuices, sucrose, lactore and corn starch. There was no vomiting. Laboratory data did not change significaptly

Throughout period 3 the amino acids were given intravenously without reaction. The plasma nitrogen given, totalling 5.88 grams, and the red cell nitrogen, ig 3 grams, are not included in the nitrogen intake of period 3. Table III. The patients general condition showed much improvement by this period. The caloric natake averaged 3.63 but on the last day be vomitted a large amount of fluid and food nitrogen content 1.12 grams. Before the first translusion the total protein of the plasma was 3.8 grams per 100 cubbe centimeters after the second translusion it was 4.8 grams per 100 cubbe centimeter. There was no edema at any time. The albumm relobulin ratio was 1.5.

In period 4 the patient was tested again on volun tary feeding. He complained of fullness after moderate intakes on the first 2 days and vomited on the third day 1 28 grams nitrogen including gastric washings from a Levine tube which was then in serted Food intake was very poor on the third and fourth days and not accurately known. On the fifth day his abdomen was opened under general anesthesis and chronic intestinal obstruction was found due to chronic inflammation of lower jejunum and upper fleura beginning about a feet distal to the ligament of Treitz. A segment of fleum about 12 inches long was resected and a side-to-side anastomosis done The specimen showed 3 greatly narrowed thick walled areas with intervening dilatations as much as 7 5 centimeters in diameter. The mucosa was ulcerated and microscopically there was a nonspecific acute and chronic inflammation. The picture was not thought to be entirely like that of regional enterlis. The patient withstood the operation we be liter of normal saline was given under the kill Solitathezie was placed in the wound and sodio sulfadiacine was given intravenously for a day postoperatively. The day before operation it plasma protein level was 3 5 gram per 100 tub centimeters. The stool collection for this period we centimeters. The stool collection for this period we

accidentally discarded without nitrogen analysis In neriod c amino acids 200 grams deily wer given for the first a days and 100 grams thereafte Sodium lactate chemically equivalent to the chlorid content was given with the amino acids. The pe tient had an afebrile postoperative period exernt it a rise to 17 o degrees C. on the day after operation He took clear fluids moderately well for the first days postoperatively and then increased to a dic similar to the preoperative one. The caloric intak averaged 1512 calories daily being 2250 on the laday On this fifth day he complained of feelin queer midway during the first injection of amin acids (to em, in 120 minutes) and again about 1 minutes after the second injection (so gm. in 6 minutes) He could not describe the feeling erce that there seemed to be a sense of fullness of the abdomen. The plasma protein concentration res from a c at the end of the second postoperative da to 64 grams per 100 cubic centimeter at the end 6 the fifth day after operation.

In the sixth period the amine acids were discoveringed and diet was changed to include steak, millingers, and other foods totalling 16.8 grams nitrogers and styte calories per day but was less than two thirds consumed the first 2 days. General condition and appetite continued to improve. Total plasm, proteins at the close of the period were 5 o grams P too cubbe centimeters.

The metabolic study was continued for 8 period beyond those of Table III with the same diet intak with and without testosterone and has been reported elsewhere (3) Nitrogen retention was greated at the end of the 40 days the weight was 49 kilorumas.

CARE : H.S (Shill so; 122) was a white femal aged 53 years, with obstructive laundice. At oper tion the call bladder and common duct were di tended with stones and white bile and a hard node was palpated in the head of the pancreas. After cholecystogastrostomy the icterus subsided ver slowly the wound drainage was bile stained and th patient's general condition and food intake we very poor Thirty days later another exploration ? vealed that the common duct wound had broke down and the cholecystogastrostomy had closed. choledochojejunostomy was performed with the patient in and out of shock. Food and fluid intal after operation were very poor for a days. There w much vomiting. The patient's veins were poor i intravenous work. On the third postoperative d amino acid feeding was begun. At this time t plasma protein concentration was 4 8 grams per cubic centimeters, plasma albumin 3 o grams 1 a 100 cubic centimeters, serum chlorides 100 mil

TABLE IV --HIGH PROTEIN FEEDING INFLUENCES RAPID HEALING OF CHRONIC WOUND
O. M., aged 5 year, nabrealed bors, detailon year

Perhal plays	Cfisical remarks			Nitroge per p	1	T		
		Nitragen Intake per period	Urine Total	Urina erea-VH3	Urine unde- termined	Faces	Nitrogra balance* per period	Weight
ı	Pinch grafts	Grams 84	Grama 55 d	Per cunt 83	Orașe 7 Q	Grama 4	Greaten †44	Kilograms 0
	Tempolitie	94	50	jia.	6.3		+05	
1	Hack grafts	Bo .	\$1 6 <del>4</del>	87	6.8	•	+ 1	
4		97	55 60	67	14	4.5	+16	5
5	1	97	ej ce	6	6	1	+	
6	Split grafts	og og	19 4	43	<b>6</b> 7	3 4		
1		80	5 7*	E45	7	6.4	+10	23.3
		07		31		to f	+24	

"Incomingate balance estimated.

equivalents per 100 cubic centimeters icterus index

In period 1 amino acids were given subcutaneously ince daily except for a intravenous injections. The calone intake was poor as the patient tended to womt when anything accumulated in the stomach, and the net intake may be estimated at not over 500 calories per day including amino acids. No nauses or vocating or other reaction was observed in relation to the amino acid injections The entire food intake torasted of orange jusce and lemonade fortified with mear and on a occasion a little tomato juice. The rountus nitrogen amounted to 1 15 grams Three phases and I whole blood transfusions were given and their nitrogen content (about 25 gm.) is not in chiled in the intake of period 1. The patient had omiderably improved in churcal condition and abjective appraisal of life by the end of the period The plasma protein total was now (last day of period) 6.4 grams per 100 cubic centimeters and the plane albumin 3 3 grams, the icterus index 16 and the serum chlorides 103 milliequivalents per 100 table centimeters.

In period a amino acids were given entirely subcitateously and the patient, now more alert and cooperative, retained daily an estimated total of two colones, after deducting for loss in wontus. Joshua nitrogen amounted to 15 grama. The effect of the plasma transfusions was not souted to the level of plasma protein declined 24 hours that to 5.0 grams per 100 cubic centimeters (first 4% of period).

A louded diet was given after persod 2 and the pation dowly but steadily improved and left the hospital. She returned 10 months after the observation of Table III and died in the hospital. At tutopsy carcinoms of head of pancress was found

The study in Table IV is presented in this report because of the importance of the thera

peutic principles it emphasizes. Chiefly these are that a high protein intake may shorten illness and save lives, and second that the best source of a high protein intake is a diet of natural foods—useful and spectacular though parenteral feeding may be

The patient in this case had been treated in two hospitals for an entire 12 months (See Case 4 Table IV) She had been treated competently in all respects except for control of diet. Good diets had probably been ordered but no measurement of actual intake had been made. The plasma protein level was not regarded as low but it was suggested by those in charge of the case after 1 month in the second hospital that parenteral feeding with amino acids might build up the patient enough for grafts to take and grow

There was no barrier in the patient to nor mal eating except lack of appetite for the routine diet. Therefore oral feeding not parenteral was indicated. The diet prescribed on the metabolism division catered to the child's taste and the intake was measured.

Within 2 months from the beginning of Table IV virtually complete healing was accomplished of what had resisted all previous treatment during 10 months. We do not mean to imply that the very high level of protein feeding used in this case (5 to 6 gm protein per kilo) was absolutely essential to its success. A somewhat lower intake might have succeeded though probably less rapidly.

Voluntary uncontrolled intake was not suffi-

Attention should be directed to the plasma present level. The total plasma protein was nearly 6 grams per 100 cubic centimeters at the beginning of Table IV 1 et the body was unable to mobilize enough protein to produce tissue to anchor skin grafts. Evidently the body was thoroughly depleted of protein even though the circulating plasma protein level was at the lower edge of the normal range After high protein feeding with much protein being produced and retained the circulating plasma protein level was 7 grams per 100 cubic centimeters or higher Such an observa tion suggests that a plasma protein level of 6 grams per 100 cubic centimeters may correlate with a poorer state of health than higher levels within the normal range

The nitrogen balance data in Table IV are only approximately accurate in that intake was calculated from standard diet tables rather than actual chemical determination and output was not always completely measured on account of incontinence. In addition nitrogen loss from the wound surface was not continuously measured. There can be to doubt, however that the balance was strongly positive in all periods except the 6th and the rapid chnical improvement and weight gain eloquently confirm the value of the treatment.

CATE q O M (SMII a); (4)) was a thin white gibt of 8 years with an unheated barn of her right high and leg One year and 1; days before the begin aling of 16e observations of Table II she unstanced a burn, largely 3rd degree, from a fire started in bed by a faulty electric heating pad Four days later she was taken to an adjacent hospital Indection was

treated with sulforamides. Three months after the burn pinch grafts were applied unsuccessfully. They were tried again a month later still unsuccessfully. Eight months after the burn the granulating area was considered suft able again but the patient went into shock under the anesthesia before the grafts could be taken and applied. Plasma applications were made locally and more sulforamide therapy was given locally. Ten months after the burn the patient was transferred to this hospital.

On admission she was thin and pale and 70 per cent of the surface of her right lower extremtly was a a plack wet gramulation thasse devoid of skin. There was a 15 degree contracture at the knee. The plasma proteins were 6.36 grams per 100 cubic centimeter by refractometer and the other routine laboratory tests appeared normal. A high protein high vitamin diet was ordered and as much analytance was given her with eating as could be spared on a busy pediat rie division. She are fairly well.

During the first month she had an upper respiratory infection and some intermittent lever possibly related to would infection. Measurement of the analysis of the production of the decisions by determining the nitrogen content of the decisions with correction by deducting the small nitrogen content of equivalent named desirings. The measured loss was 1 of grams nitrogen per day. Five weeks after admission, large spill thickness aking gatts were applied with throughout the chalque by Dr. Forrest Young. They did not take.

The reason for the failure of the grafts was not apparent Infection was controlled. The plasma protein level was above 6 grams per 100 cubic centimeter and although thin the patient was eating and did not appear emaclated. It was, however considered desirable to improve the nutritional status and a request for amino acid injections was made. The patient was transferred to the natabolism division. Since the patient was co-operative and could est normally it was decided to urge the complete consumption of a measured high protein diet. Foods were selected according to the tastes of the patient. The diet was accurately weighed and net consumption carefully measured. Vitamin supplements were continued exactly as during the preceding a months. These were ascorbic acid so milligrams, brewer's yeast tablets 1 5 grams and oleum percomorph 1.0 millliter dally

milliher daily
At the beginning of period t the patient weighed
1918 kilograms including well dressing. The
plasma protein level was 4.00 grams per 100 cubic
centimeters (by macro-helsishi assayasi) the
plasma albumin 3.70 grams per 100 cubic centimeters. The plasma chlorides and curbon dioxide
combining power were neural. There was no cridence of dehydration Seven days before the
beginning of period; a shout 12 pinch grafts were

applied
The diet contained in grams milk 800, whole egg 200 lean ham 100 frankfurt 100 lean ground beel 00, baron 30, American cheese 50, frozen fresh pess 50, dried prunes 50, white bread 50, butter 30 sugar 30 cocoa 15 The diet is calculated to contain about 132 grams protein and 2360 calories, with roughly equal weights of protein, carbohydrate, and lat. For a patient of 19 kilograms it provides 6.9 grams pro-tein and 124 calories per kilogram, as much as required by a newborn infant. The diet was not given in its entirety as listed, during any complete 5 day period The patient ate very well, and usually most of the day Some modifications were made and on some days portions of the diet were not exten. All of these were weighed back and deducted from the net intake. The net intake for example, of period a was above 6 grams protein per kilogram Urinary nitrogen outputs were determined in 14 hour periods fecal nitrogen in 5 day periods

In period a it was strikingly evident that the re cent pinch grafts were taking In addition spreading of new epithelium could be seen about some old grafts which had previously been buried by granula tion tissue. The food intake continued high despite the occurrence of acute tonsillitis with fever

More pinch graits were applied in period 3 and as these grew and the patient's weight and strength improved markedly in periods 4 and 5 it was decided to cover the whole area again with split thickness graits This was done at the beginning of period 6 The patient stood the procedure well but there was no food eaten the first day and reduced quantities

for the rest of the period

All the grafts took and healing proceeded well The high diet intake was continued for 20 days be yond period 8 Table IV but accurate measurements were not made. The entire lower extremity was covered by intact akin at this time except for one small bare area which healed during the next 4 weeks. The patient now weighed 24 3 kilograms

During periods 3 to 8 the patient had occasional nocturnal enureals. The amounts of nitrogen lost were estimated by reference to the output on ad jacent days when complete collection was obtained and the balances given in Table IV were corrected by these amounts. Slight vomiting of food occurred after the large feedings in periods 6 and 7 and this was deducted from the intake-s I grams nitrogen in period 6 and 2.8 grams in period 7 The plasma protein level rose from the initial 5 9 grams per 100 cubic centimeters to 7 10 grams by the end of period 4 and remained at this normal level. The plasma albumin level rose from 3 70 to 4.40 grams per 100 cubic centimeters

After a month of physiotherapy the patient walked out of the hospital. She had slight residual contracture of the knee. There was some foot drop possibly due to burn injury to the superficial peroneal nerve.

#### EVALUATION

Of what are amino acids capable? When is their use indicated? Are they toxic? Are they practical? Answers to all these questions are not completely given in the comments ac companying the observations presented but the trends of the answers are suggested.

Proper mixtures of amino acids are capable of providing the protein natrogen requirements of man and animals over long periods of time. They may be given either by mouth, by vein or by subcutaneous injection. Intraperitoneal injection has been successfully used in the dog (20) The importance of continuously adequate nutrition need not be discussed here. Either mixtures of crystalline amino acids or certain protein digests are capable of provid ing the protein share of it

The formula for the perfect preparation of protein nitrogen is yet to be written. There are advantages and disadvantages to all substitutes for natural protein. Digests are of less known composition, more difficult of reduplication more inflexible in composition currently are less tolerable upon rapid injec tion than certain synthetic mixtures of amino acids. On the other hand they are mexpensive to produce Amino acid mixtures contain the unnatural isomers of certain amino acids, but as discussed later no real toxicity has been demonstrated for these unnatural isomers The question of better utilization of amino acid mixtures or digests favors the former as judged by plasma protein production experi ments in dogs (20) There appears to be little difference between amigen and mixture yus intravenously in the brief test in Table I By mouth, in the comparison of Table II amugen is associated with a lower undeter mined fraction of urmary nitrogen but this test is clouded by the exacerbation of diarrhea (Case I Table II) Use of the mixture vui in dogs (18) indicates a lower tolerance for it than the tolerance for some other mixtures (21) These latter and others should be tested m man.

Uses for amino acids other than the general nutritive one may be expected to appear Individual amino acids or mixtures of individuals may be involved. The use of methionine in circumventing or alleviating toxic agents has been described in dogs (22 13) and tested clinically (5 14) It is a further stimu lating suggestion that most of the effect of added protein intake in preventing negative nitrogen balance after injury (18) may be achieved equally well by added methionine (0) an observation not yet confirmed (27)

Indications for the use of amino acids for nutritional purposes exist only when natural protein cannot be effectively used. The study in Table IV demonstrates the importance of vigorous effort in the use of natural protein. Anyone who might order parenteral feeding in such a case because of its superficial ease or therapeutic impressiveness can recognize from such comparisons in Tables I and II that efficiency of utilization may be sacrificed somewhat However for the feeding of pa

tients who cannot or should not be given protein by mouth their value parenterally is great.

There are indications for their use erally They appear to have marked value in the treatment of peptic ulcer from the inter esting work of Co Tul, using amigen. Here their buffering capacity may be as important as their nutritive value. Used to fortify the diets of protein depleted individuals they should theoretically have considerable value Such individuals must have reduced capacits to secrete the intestinal enzymes, which are proteins. Predigested protein should therefore be better handled. To illustrate this point an observation of Reifenstein and Al bright is pertinent. A young man fed wholly by parenteral amiren and glucose for 16 days was given at the next meal a full diet of natural food by mouth. He accepted it and digested it without the slightest disturbance. A fasting individual protein depleted would usually not be capable of this but must start with cautious feeding gradually increased. The difference appears to lie in the reduced capacity of the depleted individual to produce gustrointestinal linces and enzymes.

As serious toricity has yet been described with the use of proper amino acid mixtures or digests. Intolerance to the rapid injection of amino acid mixtures containing glutamic acid or much aspartic acid is manifested by vomit ing in dogs (21-16). The usual casein digests contain considerable glutamic acid. It is suggested in the observations of Table I of this paper that phenylalanine may be less tolerable than the other essential amino acids. Toxicity has been inferred for unnatural isomers but is not proved by the demonstration of interesting urmary metabolites related to their administration (s)

The use of amino acids will become increasingly practical Further improvements are desirable in the palatability of oral prepara tions Greater availability of the more tolerable intravenous preparations, such as proper mixtures of the crystalline amino acids or of digests free of glutamic acid and aspartic acid should be provided. Complete parenter al feeding is not now limited by the nitrogen intake so much as by the lack of suitable means of providing a high caloric intake Efforts to produce a satisfactory fat emulsion for intravenous administration have been long but are not yet successful (11)

#### SUMMARY

There are two sources of protein for meeting the needs of the body One is that portion of body protein which can be mobilized for a particular need in time of emergency-called the reserve protein. The other is the main and ultimate source of protein the exogenous in take, normally dictary

Of the two general routes for supplying the exogenous protein needs in disease therapy the oral route is shown to be preferable. The parenteral routes are shown to be valuable. even life-saving when oral intake is impos-

able or inadvisable

Mixtures properly prepared of the crystal line amino acids threonine valine, leucine isoleucine, lysme, tryptophane, phenylala nine, methionine histidine, arginine and gly cine are adequate for the protein nitrogen needs and marked weight gain of patients over long periods of time. Given parenterally as the sole protein nitrogen intake these amino acida are adequate for nitrogen balance in human patients.

Histadine omission from a mixture of amino acids given intravenously to a patient with plogrative colitis resulted in a negative nitroeen balance

One amino acid mixture gave similar nitrogen retention and urinary nitrogen partition to that obtained with the protein hydrolysate amigen during a brief comparison. Neither was quite so well utilized perenterally as orally and neither was quite so well utilized orally as the better natural food proteins.

No toxicity to the unnatural isomers of 7 essential amino acids was demonstrated. These crystalline amino acid mixtures are

well tolerated subcutaneously as well as intra venously even in more than 12 per cent con centration in aqueous solution. It appears, moreover that further improvements in tolerance can be made. Phenylalanine has been shown to be a limiting factor in tolerance

Marked clinical improvement occurred in a patient with chronic ulcerative coults fed certain amino acid muxtures parenterally together with carbohydrate fat, and ac cessories orally No improvement occurred when the amino acids were also given orally

The value of certain amino acid mixtures in the preoperative and postoperative nutrition of 2 patients was also demonstrated

Plasma protein levels in the range commonly regarded as low normal may be found in patients showing virtually complete exhaustion of body protein reserves. A high protein intake actually measured and given to such a protein depleted patient with a chronically unhealed wound brought about com plete healing after all other treatment had failed.

#### REFERENCES

- I. ALBANZSE, A. A. Bull. Johns Hopkins Hosp. 1944.

- 7.5 175
  ALBANERE, A. A., HOLT L. E. FRANKSTON J. E. and I.RHY V. Bull, Johns Hopkins Hosp., 1944, 74 151
  BASSET V. S. H. Josish Macy Jr. Foundation Reports, June 1943 1et 4, p. 126
  BASSET S. H., WOODO R. R., SHULL, F. W. and MADOUN S. C., N. England J. M. 1944, 230 106
- BEATTIE, J and MARSHALL, J Nature, 1944 153
- Brown, J S L. Josiah Macy Jr Foundation Re ports, February 1944 ref 6, p. 67
- 7 BRUNSCHWIG, A CLARE, D E and CORBIN N Ann.
- Surg 1042 155 1001

  8. CLARK, D. E., and BRURSCHWIO A. Proc. Soc Exp. Biol., N.Y. 1042, 49 320.
- 9. CROFT P B and PETERS, R. A. Lancet, Lond. 1945 1 166

- CUTHERTSON, D P Lancet, Lond. 1942 1 433 DUNHAM, L. J and BRUNNEHWIG A. Arch. Surg 77
- 1944, 48 395 12 ELMAN R., and WEINER, D.O. J. Am. M. Ass., 1939.
- 13 GOODELL, J. P. B. HANSON P. C. and HAWKINE,
  W. B. J. FARP M. 1944, 79 623
  14. HIMEWORTH, H. P. and GLYN. L. E. Lancet, Lond
- 1944 I 457 IS. HORARD J.E. PARKON W. STEIN K.E. EISENBERG H. and Runt V. Bull Johns Honkins Hosp. 1044 75 156
- 75 150
   MADDEN, S. C. ANDERSON F. W. DONOVAN J. C. and WHIPPLE, G. H. J. Exp. M. 1045 82 77
   MADDEN S. C. CARTIE, J. C. KATTUS, A. A. JR
- MILLER, L L., and WHIPPLE, G H I EXD M
- 1943 77 277 18. MADDEN S C and CLAY W A J Exp M 1945 82 65
- 10 MADDEN S C KATTUR, A. A. IR CARTLE I C MILLER L. L., and WHIPPLE G H. J Exp M 1945 82 181
- 20. MADDEN S C WOODS, R. R SHULL, F W and
- WIMPEL, G. H. J. Exp. M. 1944, 79 607 21 MADDEY, S. C. WOODS R. R. SEULL, F. W. RIM INCTON J H and WHIPPLY G H J Exp M
- 1000V J I and VILLER O II J AND STATES OF A STATES OF

- Macy Jr Foundation Reports, Octobe 1044, ref
- ROSE, W. C. Physiol. Rev., 1938, 18 09. ROSE, W. C., HARRES, W. J. and JOHNSON, J. E. J.
- Biol. Chem. 1943 146 683 27 SCHENKER, V., and BROWNE, J. S. L. Josiah Macy J.
- Foundation Reports, June, 1945 ref. 10, p. 393

  a8. Tut, Co, Wright A. M., Mulroul and J. H. Galvin

  T. Barcham I., and Geret G. R. Gestroenter
- ology 1945, 5.5 29 VAN SLYKE, D. D. and KUGEL, V. H. J. Blol Chem
  - 1933 102 480

# REPAIR OF LARGE ABDOMINAL DEFECTS BY PEDICLED FASCIAL FLAPS

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TWO PEDICLED PASCIAL FLAPS FOR CLOSURE OF LARGE DEFECT IN UPPER ABDOMEN

TARGE fascial defects in the upper abdomen as a result of antecedent oper ations are difficult of satisfactory closure by any method A number of years ago (1932 and 1934) the present writer described the repair of recurrent and difficult hernias and other large defects of the abdom inal wall employing the iliotibial tract of fascia lata pedicled on the tensor fascia femoris muscle as a graft This method constitutes a very satisfactory means of dealing with large defects of the abdominal wall situated below the umbilicus. Even in patients with long femura, the longest possible length of iliotibial tract of fascia is usually too short for the repair of defects immediately beneath the costal marvin without tension Furthermore attempts directed at approximating the widely separated fascial edges in an incisional hernia of wide dimensions anywhere in the abdomen are probably ill advised. First because su tures tied under tension invite necrosis of the approximated tissues and the recurrence of the hernia. Second leaving the abdominal wall tight as a drum in the process of repairing a large ventral bulge may in itself invite disaster owing to the baneful effects of increased abdominal pressure

Necessity compels search for a satisfactory method of dealing with such hernias. In the latter part of 1944 when confronted with a very large hernia in a vertical incision extending from the ensiform cartilage to a few centimeters below the umbilicus. I hit upon the method to be described herein. Fortunately however the patient was thin and it was possible to approximate the wound edges of the defect without too great tension. A few months later however a patient presented

himself with a large defect originating beneath the right costal margin and extending well beyond the midline. At operation the fascial defect measured 24 centimeters in length and 18 centimeters in width. No local siding of tissue could possibly have succeeded in closing the defect. The antecedent story is as follows:

Mr L. L. aged 63 years, University Hospital N 7 8905 was admitted with acute intestinal obstruc t on associated with large distention of the colon on June 11 013 Transverse colostomy was done a few hours after admussion. The intraluminal pressure was a centimeters of water 2000 cubic centim ters of gas was aspirated on closure of the skin. On June 30 1943 primary resection was done for the obstructing carcinoma; the pelvic col n. which proved t be an adenocarcinoma on microscopic examination The tumor was adherent to the left ureter necessitating division and ligation of the ureter A diverticulum of the bladder also was ex-cised. Thirty (30) centimeters of colon was removed. the bowel and tumor weighed 440 grams. Colonic continuity was established by oblique end to-end anastomosis. The patient was dismused from hospital 20 days later and returned for closure of the colostomy on July 28 043

In August 1944 the patient returned because of the presence of a large timor in the abdominal wall near the umbilicus. About a rear previous to the decompressive colestoory done here for acute obstruction the patient had undergone repair of a large umbilicus herms eisewhere with excision of the umbilicus. On August 28 1944 I operated upon the patient again for excision of the abdominal wall tumor believed to be an implantation transfer of malignancy to the abdominal wall, during excision of the excisions of the period of the patient of the

A good portion of the abdominal wall had to be actificed and a loop of small intentue was also exceed. The abdominal wall could not be closed attifactorily owing to the large defect occasioned by excision. If the abdominal wall tumo. On microscopic examination, the growth proved to be a deamold tumor. The desimoid tumor weighted 375 grams and measured 8 by 7,5 by 65 centimeters.

A large benta resulted (Fig. 1) The patient was

A large bernia resulted (Fig. 1) The patient was operated upon for repair f this defect on Blarch 9, 1945. The defect was very large measuring 24 by 18 centimeters. The hernia was repaired by the method fillustrated in Figure 2. Intimate adherence f a loop

From the Department of Surgery University of Managenta Hospitals, Missespeles. of small intestine to the lower margin of the hernial sac necessitated sacrifice of a loop of small intestine approximately 15 centimeters in length. Intestinal continuity was restored by oblique end to-end anastomosis Soon after the start of the operation and frequently throughout the procedure the patient's pulse was often very slow on one occasion it was counted over a period of several minutes at 32 beats per minute. When the pulse was slow the blood pressure also was usually low frequently as low as o centimeters mercury The cause of this phenome non remained obscure. A cardiogram made directly after operation failed to indicate any evidence of coronary disease. This queer behavior of the pulse and blood pressure may have been due to the cyclopropane anesthesia which was employed in all the procedures. I am inclined to believe however that it was a vagus effect occasioned by manipulation of the intestine-a circumstance which I have observed previously particularly when the intestine is distended

The patient did well and left the hospital on March 20 1945, 11 days after operation. Subsequent examinations indicate that the abdominal wall is strong and firm with no suggestion of a defect or recurrent hernia. Recent photographs indicate that the functional result is excellent (Figs. 3 and 4). There is no evidence of recurrence of the desmoot tumor or of the cancer of the colon.

### TECHNIQUE

In the instance herein recorded a large flap of the fascia covering the entire right rectus muscle and the greater portion of the left rec tus muscle also was delineated The dissection was begun just below the most lateral extent of the hernial defect on the left, the incision extending vertically downward to the pubis On the right side the fascial flap contained a good portion of the external oblique aponeu rosis as well. The flap was mobilized from below upward but not quite to the lower edge of the hernial defect. At the right extremity of the hermal defect muscular fibers of the external oblique muscle were present in the mobilized flap. In the lower abdomen the dissection was carried laterally to bare the spermatic cord in the inguinal canal

This fascial flap pedicled from its attachment at the inferior margin of the hernial defect was quite adequate to cover the hernial opening. A large portion of the patient's small intestine had been contained in the hernial sac. In freeing the adherent loops of bowel the pentioneal surface of one segment of jejunium was traumatized enough to suggest





Fig. 1 lb tograph of patient, Mr. L. 1. Uni. rs ty. Hospital No. 728005, before operation: a b and c, Viewa of h mia in upper abdomen from various d rections.

the necessity for re-ection of the segment followed by an oblique end to end anastomois. The fascial flap was sutured in plact with interrupted sutures of fine silk (No occ)

On completion of this procedure the iliotilial tract of fascia lata pedicled on the tensor fascia femois muscle was mobilized from the anterolateral aspect of the right thigh as shown in Figure 2. This technique has been described in detail elsewher. () A fairly large subcutaneous tunnel wa established

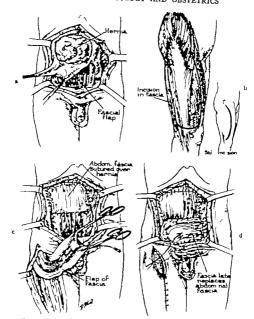
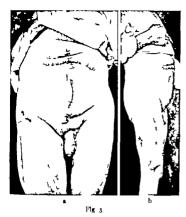


Fig. 1. Schematic drawings indicate the steps in the operative repair of the bernia shown in Figure a. The detect immediately below the right costs margin, smearing. 8 by as continueters. A perflected numerical costs and painters of the entire mixture abdoments of life the tuper as abdominated electric threat particles of the entire mixture rectus sheath beneath the mubilicity, together with portation of the mixture and approximate and fifters of the right enternal oblique massles. In the little that the total its lateral extensions of fascia lata decaurated as thap, c, The fascial flap from the lower abdomen is sevura into the abdominal defect. The perfected flap from the thigh is ready to be brought ver Poupart Rigament into the abdominal wound. d, Both flags have been satured in place.

over Poupart s ligament to permit drawing the fascial flap into the abdominal wound

Prior to operation it had been ascertained that the distance from the greater trochanter to the upper margin of the hernial defect was

36 centimeters. The greatest possible mobiluzable length of ilitotibial tract of fascia below the great trochanter was only 31 centimeters. Obviously the pedicled lhotibial tract could not be made to reach to the upper margin of



the hernial defect. It did suffice nicely how ever to cover the entire fascial defect in the lower abdomen created by swinging the first pedicled fascial flap

REPLACEMENT OF INFRAUMBILICAL MUSCULO-TENDINOUS PORTION OF THE ABDOMINAL WALL BY A SINGLE PEDICLED PASCIAL FLAP

The earlier presentation concerned itself primarily with the management of recurrent and difficult inguinal and femoral hernias (1934) by means of a pedicled fascial flap from the thigh It is desired to record here with the instance of a boy of 15 from whose lower abdomen a large desmoid tumor weigh ing 1500 grams was removed. In the removal of the tumor it became necessary to excise the greater portion of the musculotendinous struc ture of the infraumbilical portion of the abdominal wall. This large defect was closed easily and satisfactorily by swinging up the iliotibial tract of fascia lata which was ped icled on the tensor fascia femoris muscle and was re-enforced by lateral extensions of the fascia lata.

E. B. University Hospital No. 686592 admitted to the University Hospital on October 23. 1939. Preoperative diagnosis large abdominal tumor



Fig. 4. Photographs made while the patient was still in hospital a, The abdomnal incision b The thigh incision. Fig. 4. Photographs made 5 months after operation a, The abdomnial wall is strong there is no evidence of a

The patient, aged 15 years gives a story of oper ation for acute suppurative appendicitis about 3 years previously the three old scars on the abdominal wall shown in the photograph (Fig. 5) indicate the sites of drainage at the time of appendectomy He said that his abdomen enlarged gradually but his father was not aware of it until just before admission, when he took his son to a local physician who referred him here for operation. The tumor appeared to be in the abdominal wall. On rectal examination the tumor mass could be distinctly felt. A cystogram was made which showed a definite indentation of the bladder on the anterior abdominal wall the bladder being pushed distinctly posteriorly. It was obvious that this would necessitate an enormous operative procedure to excise it yet in the light of previous experience with large defects in the lower abdomen it did seem worth while to undertake excision of the tumor Closure of the defect, it was believed could be effected by the use of a fascial flap from one or both legs.

fascial defect or herma. b The thigh incusion

Operation was done on October 25 1939 under intratracheal cyclopropane anesthesia. A vertical skin excision was made in the midline extending from the umbilicus to the pubis also a vertical in cision on the lateral aspect of the thigh from just beneath the anterior superior spine to above the knee

At operation there was found an enormous tumor which filled the entire pelvis pushing the bladder posteriorly. There was an indentation on the tumor from pressure on the bladder. The tumor arose apparently from the rectus fascia in the lower ab domen and from the pubis. The removed tumor weighed 1500 grams.

### TECHNIQUE

Through the aforementioned vertical incision the tumor was gradually exposed. It was found to be on the partetal pertineum. The only site at which the abdominal cavity was opened was at the umbilicus. A slip of gut came up into the wound where the gut.



Fig.

Fig. 5. Preoperative photograph of D. B. aged. 5. University Hospital No. 680592. a and b. The large protuber ance caused by the desmoid namer of the abdominal wall c. Indicates the posterior displacement of the bladder caused by the tumor. 4. The tumor.

was apparently attached to the umbilicus. The infraumbilical portion of the rectus muscles, including the anterior and posterior sheaths of both rect: the external oblique aponeurosis as well as the internal oblique, except for the musculotendinious portion of the abdominal wall lateral to the was deferens and spermatic cord on each side was sacrificed. The abdominal wall was undercut above the umbilicus and a bit of the rectus muscles and sheaths extending above the umbilicus had to be excised. The resultant defect constituted a large area extending from the nubis below to about an inch above the um



Fig sc

bilicus superiorly. The only portion of the lower abdominal wall remaining intact lay lateral to the spermatic cord on either side.

At this juncture a large flap of fascia including the fliotibial tract of fascia in the middle and the extensions of the fascia lata covering the surtorus medially and the biceps femoris laterally pedicled on the tensor fascia femoris muscle, was brought up beneath Poupart's ligament and sutured into the defect. As the





Fig 5d.

operation was begun it was thought that fascia from both thighs might be necessary generous unilateral fascial flap however, proved quite adequate to close the defect. The musculotendinous defect into which the fascial flap was swung was 15 centimeters long and 13 centimeters wide Because of the large per sisting space overlying the bladder occasioned by the removal of the tumor it was thought well to leave a small drain in the prevescial space. The patient stood this prolonged oper ative procedure well and left the table in good condition No attempt was made to close the fascial defect in the thigh the skin edges merely being coaptated with fine silk sutures He was dismissed from hospital on Novem ber 20 1030

The pathological diagnosis (Dr. Robert Hebbel) follows

The specimen consists of a sharply demarcated somewhat lobulated mass measuring 14 by 15 by 12 centimeters. There are some attached portions of fascia and skeletal muscle. On section the tumor is fibrous and moderately firm. Centrally there is a large cystic area, 7,5 centimeters in diameter which is filled with slightly mucold fluid. The mass weighs 1500 craims.

Microscopic examination shows that for the most part cells are small and separated by an abundance of intercellular material. In a few areas and particularly in a section of a fragment removed separately from just above the penis the cells are more plump and present a greater amount of extoplasm.

Conclusion Fibrosarcoma grade I or desmold tumor of the abdominal wall

This boy now 21 years of age has been observed periodically in the outpatient clinic since the time of his operation in October 1939. The abdominal wall is strong there is no evidence of recurrence of the tumor and there is no herma. He is able to do heavy work but was rejected for military service because of the history of the abdominal wall tumor. Shortly after the initial operation my colleague. Dr. Arnold Kremen now on military leave examined the literature of desmold tumors. He told me that this tumor weighting 1500 grams was the largest desmold tumor removed surgically on record ince 1000.

#### SI MMARY

A method is described for increasing the range of utility of the ibotibial tract of fascia pedicled on the tensor fascia femoris muscle

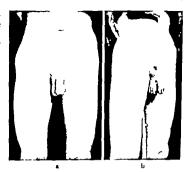


Fig. 6. A photograph made in June 1945 more than 5 years after the operation. The abdominal wall is strong and there is no defect in the f. scia, nor evidence of hernia a The abdomen. b. The incision in the thigh

in the repair of abdominal hermas. By employing the pedicled iliotibial tract as a replacement for a pedicled fascial flap swing up from the lower to the upper abdomen any herma of the abdominal wall becomes amen able to treatment by this method. Heretofor, incisional hermas with large defects in the upper abdomen have been difficult problems to resolve by any of the available methods. The procedure herein described gives promise of constituting a means of dealing satisfactorily with large defects of the upper abdominal wall. The method possesses the advantage over free fascial grafts of insuring satisfactory would healing.

The instance of a patient having a defect 24 centimeters long and 15 centimeters in width in the upper abdomen following excision of a large desmoid tumor of the abdominal wall is reported. A good firm abdominal wall resulted. A nonirritative nonabsorbable suture such as fine silk is the suture material of choice for anchoring the pedick I graft.

An in tance is cited also in which the ilio tibul tract of fascia pedicled upon the tens refascia femoris musele was empleyed to replace the larger part of the muscul dascial portion of the abdominal wall below the unfolicity attending excision of a large desmoil tumor

weighing 1500 grams. The defect was 15 cen timeters in length and 13 centimeters in width A single pedicled graft of the illustibial tract supplemented by its lateral extensions of fascia lats sufficed to fill the defect

Removal of such large fascial flaps from the thigh does not impair its function and is not followed by untoward effects.

### ADDENDUM-

Since this paper was submitted for publication 3 additional patients have been operated upon for the repair of large abdominal defects. In the first a patient with an unusually large incisional hernia the plan of operation described herein was employed. Lach of the other 2 patients presented a large carci nomatous mass in the abdominal wall following a Mikulicz exteriorization operation for cancer of the pelvic colon. The case records follow

CASE 1 Mrs A E aged 66 years University Hospital No 601240 was admitted on September 30 1045 for repair of a large inciseonal h mis following drainage of the gall bladder (long vertical right rectus incusion) performed elsewhere several years previously An unsuccessful attempt had been made before admission here to repair the hernia. The defect was enormous and extended from the pelvis to the costal margin. In extent the defect measured 26 by 21 centimeters. The scheme described in this paper was employed to close the defect Fascial flans from the lower abdomen constituted by the anterior rectus fascia and its lateral extensions were delineated from both sides of the long vertical defect The upper and most lateral uing of each of these pedicled fascial flaps was swung upward to close the upper portion of the hernise defect. The longest and widest possible pedicled fascial flap was swung up from the right thigh pedicled on the tensor fascia femoris muscle employing the entire illutibial tract of fascia. A satisfactory closure of the large defect was obtained. The abdominal wound healed kindly and the abdominal wall appears strong with no sug gestion of a persustent defect. Owing to the curved nature of the incision on the thigh, a small slough oc curred at the convex portion of the skin flap which prolonged the hospital stay. The final result seems to be very satisfactory

CARE 2 Min. J K aged 66 years, University Hospital No. 27515 was admitted to the University Hospital on August 26 1045 for a recurrent card nome of the abdominal wall and sigmoid colon following an exteriorization operation performed else where 3 years previously. Excision or wears of abominal wall and cole tumor with prunary closed anastomosis. A mucocele of the appendix was exceed also A large fascast flap pedided on the tensor fascia fermons muscle from the left thigh sufficed to fill the large abdominal wall defect. The patient was duminsed from hospital 8 days after operation. The abdominal wall is strong.

Case 3 Mr G S aged 64 years, University Hospital No 760142 was admitted on November 14 1045 had a large fungating cauliflower lesion in the abdominal wall Two earlier Mikulicz exterioriza tion procedures had been done elsewhere for a carcinoma of the lower pelvic colon, the first 2 years prior to admis ion here. At operation, November 10, 1045 the major part of the infraumblical portion of the abdominal wall was exceed including the ski There was a single large metastasm in the l'ver which was said to have been present already at the time of the first exteriorization operation done 2 years previ The tumor involved the rectosigmoid area and was intimately adherent to the bladder and several coils of small intestine. There was a separate fairly large carcinoma in the multransverse colon-The left ureter was sacrificed. The tumor of the abdominal wall was excised on masse with the colon and a primary closed anastomous was effected between the proximal th rd of the transverse colon and the rectum 11 centimeters from the anus. The resultant abdominal defect involved all the structures of the abdominal wall including skin fascia, muscle and peritoneum the defect was 20 centimeters from above downward and 16 centimeters across in a horizontal direction A long fascial flap was swung up from the left thigh which replaced satisfactorily the peritoneolascial defect. The skin was closed by a sliding maneuver This 10 hour operation was withstood nicely by the patient. Owing to some tension, a slough occurred in one of the skin flans necessitating a secondary skin graft. The patient other wise made a satisfactory convalescence and the abdominal wall is strong At present the pati at is at home awaiting re-entry for excision of the bepatic

### REFERENCES

metestasis

WARGERSTEEN O. H. Minnesota M. 93 5 439 Idem Surg Gyn Obel. 1934. 59 766-780.

### CHEMOTHERAPY AND CONTROL OF INFECTION AMONG VICTIMS OF THE COCOANUT GROVE DISASTER

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T the time of the Cocoanut Grove disaster opinions concerning the effi cacy of various forms of sulfonamide therapy in wounds and burns were still divided Lyons (3) had reviewed the liter ature dealing with the rationale of local sul fonamide therapy and also the somewhat mea ger clinical reports then available on its prophylactic value He observed that "the rather enthusiastic clinical adoption of local sulfona mide therapy had failed to provide factual data for analysis of the extent to which such treatment had prevented the growth of bac tens in wounds.

Such data were being accumulated at that time by the Contaminated Wound and Burn Projects sponsored by the Subcommittee on Surgical Infection of the National Research Council The results of these carefully controlled observations were already providing evidence which served to temper considerably the enthusiastic reports brought back by some of those who had an opportunity to observe the casualties at Pearl Harbor

Based on the evidence which was available at that time and which was subsequently confirmed and greatly amplified in Meleney's report (5) the Burns Project 'as set up at the Boston City Hospital at the time of the Cocounut Grove fire did not include the local use of sulfonamides There were only 2 cases among the Cocoanut Grove victims at this hospital in which sulfanilamide powder was applied locally on some occasions and 2 others in which sulfathuzzole outment was applied to some of the burned areas about the face

This therapy however played only a minor rôle in the management of these cases.

The systemic use of sulfonamides in the present cases was undertaken from two senarate though similar, considerations. First with respect to the surface burns it was thought that chemotherapy might be useful in limiting infection to the burned areas and that cellulitis and septicemia might thereby be prevented Secondly since respiratory tract in volvement constituted such an important part of the injuries in these cases, the use of sulfonamides was considered to be the best avail able means of preventing or minimizing pul monary infections which were expected to complicate these injuries. These indication seemed reasonable on the basis of the known clinical experience although there was very little in the way of conclusive evidence from published reports that the drugs would serve those purposes.

The administration of sulfonamides in many of the present cases involved consider able difficulties. Because of the wide differ ences in the general condition of the patients. in the extent of their surface burns and respir atory injuries and in other incidental complications the treatment had to be individual ized and controlled with great care. major problems arose chiefly from 3 sources namely (1) shock and its effect on the circu lation and on renal function (2) impairment of renal function associated with hemoglobi nune and (3) difficulties in maintaining proper water and electrolyte balance particularly in view of the use of large amounts of plasma and the tendency on the part of some of the surreons to avoid the administration of additional fluids. All 3 of these factors were thus focused on the one point of avoiding the most frequent of the serious complications of sulfonamide therapy namely those involving the urinary tract

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The work described in this paper was done, in part, under a street recommended by the Cosmultee on Medical Research Services (to Differ of Service). Research at Development and Harrard Medical School.

Harrard University

The present report comprises an analysis of the sulfonamide therapy as actually used in the cases admitted to the Boston City Hospital from the Cocoanut Grove fire. An attempt will be made to evaluate the results of this therapy as far as that can be done from the data available. The bacteriological findings are summarized for some of the cases in which significant infection occurred in the burned areas and in the respiratory tract. The relevant findings with respect to fluid and drug administration in illustrative cases and groups of cases will be aumarized.

## ANALYSIS OF THE SULFONAMIDE THERAPY USED

As already intimated neither the local nor the systemic use of sulfonamides formed a part of the program of the routine manage ment of burns in this hospital at the time of the disaster. During the first few hours after the fire little attention was therefore paid to the problem of chemotherapy in the present cases and only an occasional patient recrived it orally or as part of the parenteral fluid.

therapy given at that time

Selection of cases for sulfonamide therapy During the surveys of all the patients which were made by the authors on the morning and evening after the fire and at regular intervals thereafter particular attention was paid to the problem of sulfonamide therapy Details of the therapy prescribed depended on the state of hydration the urine output the ability of the patient to take medication orally and the results of blood studies. In many instances it was considered inadvisable to start therapy during the first day or two because of the low or absent unnary output, because of nitrogen retention hemoglobinums or for other reasons. In other patients with minor burns treatment was not given at first but was started later usually because of the respiratory tract com plications.

A total of 76 patients received sulfonamide therapy. In Table I there is given an analysis of these cases with respect to the time when the treatment was begun, its duration and the total amount of drug used. The cases are arranged according to the severity of respira tory tract involvement. Sulfonamides were

not used in 24 of the fatal cases and in 31 of the survivors. The former included most of the patients who had the most extensive sur face burns and were in shock at the time of arrival or shortly thereafter and also those with the severest respiratory tract damage who had symptoms of respiratory obstruction soon after they arrived. All of these patients died during the first 2 days and 15 of them dled within the first 24 hours. Among the survivors who were not given sulfonamide drugs were 19 patients who were discharged or transferred to other hospitals during the first 18 hours, 4 others with minimal involve ment who were discharged within 36 hours and 2 who were kept in the hospital for infuries other than burns. The remaining 6 patients had burns involving 5 per cent or less of the surface area which were not severe and were associated with minimal, if any respiratory complications. Slight and transient fever oc curred in 3 of the latter patients and that constituted the only evidence of possible in fection among the patients who did not receive sulfonamide drugs.

Time of beginning treatment Treatment was begun within the first 24 hours in 20 of the cases during the second day in 40 cases and later in the remaining 16 Half of the cases of each of the first 2 groups had severe respiratory symptoms and the others had either moderate respiratory damage or fairly extensive burns. Only 3 of the 16 patients in whom treatment was begun on the third day or later had severe respiratory tract involvement. Two of them had no surface burns while the third had burns involving almost two-thirds of the body surface and died on the day after the drug was started Among those with mild or moderate respiratory involvement in whom treatment was delayed 3 had burns of 20 per cent or more of their body surface. Four had burns of 6 to 8 per cent and the rest had only minor burns. In only 1 of these patients (Case 59) did it seem likely that infection of the wound contributed materially to delay in healing or to the prolonged stay of the patient in the hospital. The delay in starting treat ment was usually due to the factors already outlined but chiefly to the fact that the patients had a poor urmary output

Choice of drug Sulfadiazine or its sodium salt was used more or less routinely and this drug was given to all but 5 of the 76 patients. Sulfapyrazine was used in 2 cases and sulfa thiazole in 14 but in only 1 of the former and in 4 of the latter were these drugs used alone. In the remaining cases the sulfapyrazine or sulfathiazole was given after sulfadiazine either because the patient had untoward re actions attributable to sulfadiazine or as the

supply of that drug was temporarily exhausted Route It was considered desirable to use the oral route for administration of the sul fonamides as far as possible this method offer ing the least likelihood of producing unnary tract complications. The intravenous route was used for the initial dose in some of the cases with the severest burns. In almost all such cases fluids other than plasma or blood were being given by this route and the pa tients were fairly well hydrated. All of the intravenous drug was given as sodium sulfa diazine dissolved in physiological saline in concentrations of o 5 per cent or less of the drug. As far as could be ascertained no renal complications occurred that could be attn buted to the parenteral chemotherapy increase in the nonprotein nitrogen occurred in 2 fatal cases but in both of them hemoglobinuma oliguna and some elevation of the nonprotein nitrogen were already present before the sulfonamide treatment was started

The initial dose of sulfadiazine Dosage which is customarily given to adults in this hospital is 4 grams orally or 5 grams of the sodium sait when given parenterally present cases since the drugs were being used chiefly for prophylaxis and also because of the greater possibility of kidney injury and of difficulties of maintaining fluid and electrolyte balance, smaller initial doses were given in many of the cases. In 8 of the patients in whom treatment was begun by an intravenous injection the initial dose was 2 to 3 grams and about one-half of those who received oral therapy were given 2 grams for the first dose. The latter was usually repeated after 4 hours. The maintenance dose was that which is customarily used namely 1 gram every 4 hours but modifications were made from time to time as indicated by clinical and laboratory

findings in the individual cases. In a few instances the parenteral injections were repeated once after 8 to 12 hours but only 1 patient received 3 and 1 other received 4 intravenous injections. All the parenteral injections given after the first one consisted of 2 5 grams of the drug

Alkalıs The use of alkalis was limited chiefly to the patients with extensive burns. They were first given during the early surrey of the patients because of the finding of some cases with hemoglobinums among those who were severely burned. All of these patients in whom bemoglobinums was detected and most of the others who had extensive burns were given alkalis at that time They were admin istered in the form of sodium bicarbonate orally when possible or in the form of 1/4 molar sodium lactate intravenously as a sunplement to other parenteral fluids. The alkali therapy was intended as a preventive against possible renal complications. These were an ticipated more because of the hemoglobinuria than from the chemotherapy although the latter consideration also entered into the deci sion to use the alkalis

It must be stated however that the alkalis were not given without some hesitation. The possibility of water retention resulting from the sodium administration and the consequent aggravation of the edema and exudation from the wounds or the development of pul monary edema were considered. The finding of highly acid urine in the cases of hemoglobi nuria was the deciding factor. An attempt was made wherever possible to adjust the dose so as to give a neutral or slightly alkaline urine. Usually 1 or 2 grams of sodium bicar bonate was given with each dose of sulfona mide In most instances the alkalis were dis continued after the patient was able to take adequate amounts of fluid and to maintain a good urine output but it was stopped earlier if dependent edema developed outside of the burned areas or if the urine output continued to be small.

Duration of chemotherapy (Table I) Treat ment with sulfonamides was maintained for an average of 11 days and a second course of

Mace the plants and was derived from citys of their fathers had already received considerable amounts of todays from this source

TABLE 1—ANALYSIS OF CHEMOTHERAPY AS USED IN THE CASES ADMITTED TO THE BOSTON CITY HOSPITAL FROM THE COCOA NUT GROVE FIRE

	,	TO THE		
Oracle of respiratory (avolvement	Viene.	3/Dat moderate	Servera	All
Number of patients who re- covered sulforamides	4	374	11	76.0
Sulfermide therapy began First day	_		104	242
recent day		164	805	100
Third day or later		1	31	161
Duration of million amade therapy Less than day			٠	
r- days			*	74
н		•		
8-c4 days		3	791	879
3 days of longer	14	r	10	101
Average ammber of days	174	1988	7	
Yember to received drug puresterally			-	, <u>u</u>
Average parenteral dose (grass)	_	*	+	*
Total days (grazas) Less than 10			- 41	r.
10- 4			4	4
11-43		LD	+	·
\$ <del>**-\$</del> 0	5	14		30
DEC OF SECTO			•	7
Average date	9744	<b>11.5</b>	7431	644

The figures for the fatal cases or green in the superscripts

therapy was given before and during skin grafts in a few cases and in some others be cause of recurrent fever. The cases in which the drug was used for 4 days or less included o in which death intervened and 8 in which the burns were either absent or of minor extent and sevently and the respiratory damage was relatively mild. On the other hand, those in which treatment was continued for more than 2 weeks included most of the patients who had either extensive and severe burns or severe respiratory damage or both.

Total dose The amount of drug used in the time over which it was given The average total dose per patient was 60 grams which was only alightly less than 6 grams per day. This reflected the fact that, in general, full doses were maintained throughout the course of treatment. In a few instances, however

TABLE II —TOXIC EFFECTS FROM SULFOMMIDE DRUGS OBSERVED AMONG 76 CASES AD-MITTED TO THE BOSTON CITY HOSPITAL

THE COCOAN	OI OKOAL ME	E
Teric menifestation Fever without reals		Ke et case
Rath and fever		4
Leucopenia (2000 or less) Hematuria (microscopic)		3
Repai colic		3.
Nitrogen retention Names and vomiting		3 1
Total number of patients		17
"facipies ; with drug favor and	with result cale.	

the dally dose was reduced temporarily be cause of retention of water nitrogen or drug

Blood levels Chemical determinations of sulfonamide levels in the blood were done frequently in some cases and irregularly in others. They were carried out frequently in patients in whom difficulties were encountered in the administration of fluids and also in those having abnormal urinary findings or high blood nonprotein nitrogen levels. Some idea of the drug levels found in the blood may be had from Figure 1 which shows the concentrations of free drug observed during the first 3 weeks. For the most part, as will appear later from the data of individual cases, there was a fairly constant and small amount of acetylated drug in the blood about 1 milligram per 100 cubic centimeters in the majority of cases. The level of the free drug in the blood was most often between 4 and 8 milli grams per 100 milliliters. High levels were encountered more frequently during the first few days and low levels were more frequent after the first week. On the whole these low and irregular values reflect the difficulties in controlling the various aspects of chemotherapy in many of the patients, particularly those who were severely ill. This aspect, too will appear from the charts of individual cases.

Toxic effects (Table II) An estimation of the frequency with which toxic effects were observed in the present group is necessarily inadequate. Some of the untoward manifestations were undoubtedly masked or went un observed for one reason or another. In addition it was difficult to determine whether or not certain manifestations were attributable

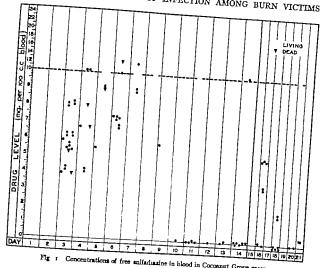


Fig. 1. Concentrations of free sulfadiantee in blood in Coconnut Grove cases.

to the toxicity of the drug. Thus there were 3 cases in which blood nonprotein nitrogen levels rose early in the course of therapy but m each case hemoglobinuma oliguma and abnormally high levels of nonprotein nitrogen were noted before the drug was first given

There were 7 cases in which fever could be attributed definitely to drug toxicity. In 3 mstances this fever was associated with a scarlatiniform or morbilliform rash (with epi scients in one of them) which appeared on the fifth day in one case on the seventh day in another and on the eighth day of the second course of treatment in the third case. In the latter the same drug (sulfadiazine) had been given for 23 days during the first course and an interval of 3 weeks had elapsed before the second course was started In each of these 3 cases the rash subsided when the sulfadiazine was stopped although sulfathuazole or sulfa pyrazine was used to continue the treatment without interruption Drug fever unaccom

panied by a rash began on the 10th, 11th 12th and 20th days respectively, of sulfadiazine therapy In each of the 4 cases the fever subsided within a day after the sulfadiazine was discontinued and in one of them sulfapyrazine was used to maintain chemotherapy without interruption In one other patient a second course of sulfadiazine was given after an inter val of 10 days and full doses were given for 5 days without a recurrence of the fever

Urinary tract complications were observed in 5 cases in addition to the 3 with the nitrogen retention which have already been mentioned Microscopic hematuria was the only manifestation of this complication in 3 cases. It was observed on the 7th and 9th day and was not accompanied by crystalluria. In the fourth case gross hematuria with dysuria occurred on the third day and cleared rapidly when the fluid intake and output were increased. In the fifth case there was renal colic accompanied by microscopic hematuria on the fourth day

TABLE III —ANALYSIS OF THE OCCURPENCE OF FEVER IN CASES ADMITTED TO THE BOSTON CITY HOSPITAL FROM THE COCOANUT GROVE

	-	_			_	
Selfonemide throupy						
Amilyon of Green	OB.	_	Not a	Total		
	Recov-	Dead	Recor-	Deed		
A Ount of fever* First day	40		,	10	64	
Second day	1.8			1	_	
There day	-					
Fourth day		Ε.		-		
Fifth day		-		-	3	
Sirth day		Γ''-		-	_	
No ferrer						
Tetal	•	3	1		904	
B Duration of ferrer* None		-				
day or leas	16			<b>30</b>	ч	
dy.		4			,	
3 days	•	ŀ			•	
4 days	•	-				
p-7 days	5	3		=:		
8-c4 days	u		]		4	
5 or more days	•			-	•	
Tetal			_ 1			
C Maximum temperature First 45 hours 100-101 <sup>6</sup>	po			,		
en-tol <sub>9</sub>	#	6			n	
roy" or lagion				- 1		
Total cases with fever	57	14	3	•	83	
Total cases observed	•	5	_,		μσι	
Third and fourth days	,	1		]	24	
100 tog*	r6	3		- 1	9	
104°— or leigher		3		-	3	
Total cases with form	33				فه	
Total cases observed	64		1		-	
Fifth to teeth days 100-see	1			_		
101-1 1°						
rog* or higher		3	- 1	_]	3_	
Total cases with lever	*	1			*	
Total cases observed	6		1		75	

and this cleared within a few hours following intravenous fluid administration

Severe nausen was attributed to sulfada zine in one case and vomiting was attributed to sulfathuazole in another These symptoms began early and cleared rapidly when the drug was stopped. Leucopenia was encountered in 2 cases. In Case 47 the white blood cell count was 4,000 on the thurteenth day which was 1 day after the drug had been stopped. In Case sa the total white count was 2 000 on the twelfth day 2 days before the drug was stonged. The count in this case rose to 16 000 on the fifteenth day without any special treat ment directed at the leucopenia. The total dose used was 54 grams in 12 days in the for mer and 70 grams in 14 days in the latter. In neither of these cases was the percentage of granulocytes depressed

On the whole therefore it may be said that the incidence of untoward effects of chemotherapy was very low. Excluding the cases of hematuna and the rease of colle these tone effects were not serious. It is possible of course that other minor toxic effects were overlooked or that some of the symptoms ascribed to other factors may have been due to the drug. It is fart to say however that more serious complications and larger num bers of them were probably avoided by external virillance.

### RESULTS

Any attempt to evaluate the effects of chemotherapy in the prevention or control of infection in the present group of cases must of necessity be little more than an expression of oninion or of impressions. Even the estimation of the presence, extent and severity of infection was beset with considerable difficul ties. As to the burned surfaces, their appear ance, odor and the presence of purulent exudate containing bacteria, or the development of lymphangitis or cellulitis in the vicinity of the burns were relied upon to give evidence of infection The significance of that infection, however could not readily be determined in each instance. Healing apparently proceeded rapidly in spite of such infection in many of the cases with superficial burns, while in others particularly in third degree burns the

infection undoubtedly contributed to the development of malnutrition and also consider ably delayed the healing process. With regard to the pulmonary lesions also it was not possible to determine in most instances to what extent the physical signs and x ray find ings were the result either of the original in junes or of superimposed infections

In order to obtain some idea as to the amount of infection present in these cases some of the objective findings will be sum manzed. The occurrence of fever and leucocytosis at various intervals after the injuries will be analyzed from that point of view The available bacteriological findings will be presented and correlated with the other evidences

Pever An analysis of the occurrence of fever in the patients who were in the hospital for 18 hours or longer is given in Table III Of the 101 patients in whom data were avail able only 10 remained completely afebrile One of these 10 patients died during the first day but the others had only minor surface burns or respiratory injuries. Only 1 of the latter cases received chemotherapy and this was given only during the first day

Fever occurred very early in most of the cases with moderate or severe burns and in those with respiratory damage In 85 of the 91 patients who had fever at some time during their course, an elevation of temperature to 100 degrees For higher was recorded during the first or second day In almost every instance the fever was associated with surface burns of varying extent. This early appearance of fever can hardly be attributed to infection It did, however contribute to the difficulties in recognizing the presence of infection which may have occurred during the first few days The fever was usually of short duration In about two-thirds of the cases it lasted for 4 days or less but the proportion of patients having such a short febrile course was smaller among the survivors and somewhat higher among the fatal cases, many of whom died during this period. In most of these cases in fection probably played only a minor role In the remaining cases the fever was probably due to infections which usually were limited to the burned surfaces

The 8 patients who had fever for more than 2 weeks are of interest. In 6 of them the burns involved 20 per cent or more of the body sur face Of the 2 remaining patients one (Case 68) had burns involving only 5 per cent of the body but some of the areas were deep and badly infected. This patient had no respira tory tract involvement. In the other patient (Case 22) on the other hand, the surface burns were relatively clean but there was marked respiratory injury with massive atel ectasis of the left lower lobe and probably pneumonia superimposed in that lobe, and these were very slow to clear In very few other cases could persistence of fever be at tributed solely to respiratory tract infections

In all of the fatal cases there was fever throughout most of the first few days except in those patients who died very early Among those who recovered and were treated with sulfonamides the proportion of patients hav ing fever dropped progressively from 92 per cent in the first 2 days to 54 per cent during the third and fourth days and 43 per cent during the next 6 days Among the 13 patients who recovered but did not receive sulfona mides only 5 had any fever These patients however had only minor surface burns and no respiratory tract involvement and in no instance did their temperature risc above

The maximum temperatures observed were usually not very high In more than half of the cases it was less than 102 degrees F and in all but 12 of the remaining cases it was below 104 degrees. Those in whom the temperature rose to 104 degrees or higher are of special interest. Of the 8 who had such high fever during the first 48 hours only i survived This was a patient (Case 24) with a burn of 14 per cent of the body and a moderately severe (Grade 3) respiratory tract involve ment. There was infection of the burned area later in this case but probably little if any infection of the respiratory tract, and the temperature levels were lower after the second day The remaining 7 patients all died before the end of the second day The temperature before death reached 106 degrees in 2 of them 107 5 degrees in the third and 109 degrees in a fourth

TABLE VI.-BACTERIOLOGICAL FINDINGS IN THE INFECTED SURFACE BURNS IN RELATION TO SHILFONALIDE THERAPY

Cam	Per c	est of bersed	c	hemothem	197	Dy	Blood	Lecation of interest	
No.	Twal	Third degrees	Day berra	Day	Total,	culture	1	el interest burn	Organisms found
9	5			6	85		7.0	Back of head	See ; B proc.; Str a; Dipinheraids
	•			15	55	ıı	-4	Head	3 m Str. #; R. coll
		1		}	l	•	_	Hand	Ban ; Str S ; B cole; R. morgani
1	-	7	_	•	14			How	San; Str #; Str a; B protron; B cak, Diph thereids
				r6	5	14		Rost	B coll S au ; B pyce ; B margani, B feralm alles laures
						J2		Hand	Str # B coll; S m; B protess
		}	1	j		· ·	_	Leg	Str # 3 proteon: Deptheroids
7	)e	5		- 5	14	Jio .		Scalp	S nu , Str #, S alben; B proteum Dephtherseds
			45	H	_14	B		boulp	BMC, Type B; San ; Str #
- 1		l i		76	1_	93		Graft secretion	San . M Dredens R trees
						96		Graft secretion	San Ber dij le proteon; li pyec ; è albus
	5	5		3	,	17	_	Beck	B pyce ; Sau , Diphthareits
						21		Beck	Sau Str. fij ber.er is welches Depitheruch
15	1		J :	•	n	24	_	Head	B pyse ; S am
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3 calculations among expendation (Freedmander) backling.

hemolysis while in others the alpha hemolytic streptococci occurred independently Friedlaender's bacilli were all identified as Group B

Blood cultures were taken during the febrile course in many of the cases and most of them were sterile. Staphylococcus albus was recovered from blood cultures in 2 cases diph theroids in 1 case and gram negative bacilli in 3 others. The significance of these findings is not certain but the organisms were con indered at the time to be contaminants since other blood cultures in the same cases were negative In Case 131 cultures of the infected wounds were not made but pyocyaneus bacil lus was obtained from a culture of the blood on the eighth day Earlier and later blood cul-

tures in this case were negative

Bacteriology of the sputtim Bacteriological studies of sputum were made on 1 or more occasions in 13 cases including a in which cultures were also made of the wounds. In 10 of the cases there were severe grades of respiratory involvement. The sputum specimens were obtained from the patients after the mouth and pharynx were cleared by rinsing and gargling with tap water. They were taken directly to the laboratory where they were streaked on the surface of blood agar plates grown in blood broth and injected into mice Gram and Wright stained smears were made directly from the sputum and Neufeld typing was carried out when organisms resembling pneumococca were seen. In contrast to the wound cultures those of the souturn were made during the first 2 weeks and while the patients were still receiving sulfonamides. The character of the sputums and the results of the bacteriological studies are listed in Table VII together with a summary of the aignificant features concerning the chemotherapy employed in the cases.

Most of the sputum specimens obtained early were quite scant mucoid and slightly purulent, and smears showed numerous squamous and sometimes ciliated epithial cells Some of the later ones were frankly purulent and had either a yellowish greenish or chalky appearance. In a cases, some of the specimens were either rusty blood streaked or pink in color due to admixture of blood

As was the case in the wound cultures the organism found with the greatest regularity and in the greatest numbers in the sputum was Staphylococcus aureus. This organism was cultured from almost every specimen obtained from 12 of the cases and it was the predominant organism found in many of these cultures. All of the strains were hemolytic and produced coagulase

The streptococci obtained from the sputum were predominantly alpha hemolytic, and some nonhemolytic strains were also found These were considered to be part of the normal mouth flora although in some instances they constituted one half or more of the colonies that grew in the direct cultures on blood agar plates Beta hemolytic streptococci were obtained only in Case 36, but although they appeared in considerable numbers, there was no clinical evidence of anything which could be interpreted as a hemolytic streptococcal infection in this case

Pneumococci were obtained in significant numbers in 5 cases. In 3 of them types III VIII and XXIV pneumococci were obtained only in the first specimen and in r case type IV pneumococci were obtained in the first 2 specimens of sputum and no pneumococci could be found in any subsequent specimens In the fifth case type XXII pneumococci were identified in large numbers in 4 of the 5 specimens studied. In some instances the pneumococci showed evidence of drug action in the stained smears made directly from the sputum From each of the specimens containing pneu mococci other organisms, particularly staphy lococci were also obtained in large numbers

Influenza bacilli were identified in one or more specimens from 4 cases and miscella neous other organisms were also encountered either in the smears or in the cultures

The significance of any of these organisms and the part which they played in pulmonary pathology cannot be stated with any degree of certainty The purulent character of the sputum in some of the cases strongly sug gested that the Staphylococcus aureus which was so abundant was actually active and con tributing to the necrotizing character of the lesions already present in the trachea and bronchi and possible also in the lungs. I re-

TABLE VII.-BACTERIOLOGICAL FINDINGS IN SPUTUM IN RELATION TO CHEMOTHERAPY

	Orada af	O.	Chestothers		Chemothory		Chemethonyy		Chemotherapy		Chestothorapy		Chemothorapy		Chemotherapy		Day	Blood		
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	l	L			54	11	Frothy; muc; rusty	\$tr =(90%); \$.m (10%)												
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_	l	L . '		} _ 1	•	-	Nuc-per	H led (55%)  Lan. (40%)  Br n(5%) at 1												
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	l	(		( (	35	=	Throat semb	Str m(\$5%) \$ au (10%); B pyrac.; G-diple												
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For expirantions and abbreviations see Table VI

Mosel culture on Ma day-\$ proc.

sumably the pneumococci also played a rôle in some of the cases.

As already indicated, it was difficult to determine the part played by infection in the abnormal physical and x ray findings in the lungs. In many of the cases with extensive agas fever and leucocytosis probably resulted from the skin lesions. This was particularly true in those cases in which infection of the

burned areas was apparent. Most of the patients with extensive pulmonary lessons had lever and leucocytosis during part of their course and, with few exceptions, these evidences of infection improved with the healing of the surface burns. On the whole considering the extensive amount of respiratory damage present at the time of admission in this group of cases, it may be stated categorically

that infections of the respiratory tract were relatively few and generally mild. Further more, it seems reasonable to ascribe this comparative mildness and infrequency of the respiratory tract infections to the chemotherapy which these patients obtained during the first week or two in the hospital.

There was also every reason to believe that none of the patients died primarily as a result of infection of the respiratory tract. There is one possible exception. This was a patient (Case 110) with severe and extensive burns who seemed much improved after 3 weeks of a rather stormy course. He was then transferred to another hospital for skin grafting and further care. He had no clinical evidence of pulmonary involvement when he left the hospital and x rays at that time showed his lungs to be essentially clear Soon after he arrived at the other hospital he developed high fever and respiratory distress and died 6 days later Autopsy in this case showed an extensive necrotizing type of staphylococcal pneumonia and evidence of the underlying tracheobronchial damage which was similar to that found in other cases. Definite evidence of early confluent staphylococcal pneumonia was also present in Case 107 In this case a tracheotomy was performed early and death occurred on the seventh day and resulted from respiratory obstruction. In the other fatal cases infection played only a minor rôle in the pathology of the respiratory tract as found at autopsy

### CASES ILLUSTRATING THE USE OF CHEMOTHERAPY

It has already been indicated that the urgent needs of patients made it difficult and at times impossible to make and record a considerable number of observations which would have been useful for the purpose of evaluating many important features of the various types of cases encountered. This is particularly true with respect to the evaluation of the results of the various therapeutic agents and procedures used. After the initial phases however a number of studies were made and some of them are of interest in spite of the paucity of earlier data. Because of the pecular problems presented in the administration

of sulfonamides in many of the cases from the Cocoant Grove fire studies of this aspect were undertaken in representative cases as soon as it became feasible. The results of the studies will be presented by summarizing the findings in characteristic cases in which there were various combinations of surface burns and respiratory injuries of different degrees of seventy. The data in these cases will be shown in the accompanying figures.

Cases of hemoglobinuma and impaired renal function Among the first problems encoun tered during the initial survey of the cases for the purpose of outlining a program of chemotherapy were the scant urmary outputs and their association with hemoglobinums in a few of those who were most severly burned. As already stated, this finding prompted the use of alkalis which were given at the time with the view of preventing or minimizing renal complications from that source. This procedure seemed justified because of the high acidity of the urine in these cases but the possibility of water retention was borne in Attempts were therefore, made to keep track of the fluid balance as far as possible. It was the finding of hemoglobinuria and oliguria which prompted the excessive caution and delay in initiating sulfonamide treatment in some of the cases at least until alkalis had been given and a reasonable out out of unne assured.

Details concerning the hematologic and other interesting findings in these cases as well as studies dealing with the mechanism of hemoglobinura are given in the paper by Shen Ham and Fleming Most of the Cocoa nut Grove cases in which this complication was recognized died early. The observations relevant to the chemotherapy in 4 of the fatal cases with hemoglobinuria in which death occurred on or after the fourth day are shown in Figure 2 and the findings in the only patient admitted from this fire who survived this com plication are shown in Figure 3. Each of these 5 patients had burns which involved 45 per cent or more of their body surface and were mostly third degree Shock was present on admission in Cases 119 125 and 131 while in others it was averted in the early phases by vigorous treatment with plasma and fluids

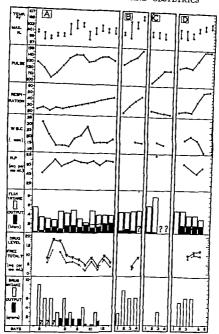


Fig. s. Findings in 4 fatal cases with hemoglobisuria. A, Case 31; B Case 1 9 C, Case 190 D Case 5.

During the first 24 hours each patient received between 3 and 5 liters of fluid mostly by the intravenous route in addition to the large amounts of plasma. Large amounts of fluid and varying amounts of plasma were also given during the succeeding days. Only I of these patients, however excreted a significant quantity of urine during the first day (Case 38 Fig. 1) and he continued to maintain

a fairly good output. In Case 125 (Fig. 2D) there was a good output of urine on the second day and thereafter in Case 179 and Case 120 (Figs. 2B and 2C respectively) the output continued to be small while in Case 131 (Fig. 2A) it improved steadily over a period of 4 days.

Sulfadiague was started at the end of the first day in Case 119 during the second day in Cases 125 and 131 and early in the third day

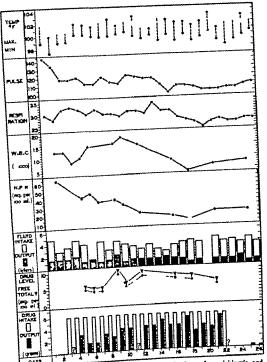


Fig. 2. Findings in Case 35 in which there were extensive burns, hemoglobinutia, and recovery

in Cases 38 and 120. The initial dose was given intravenously except in Case 38. Treat ment was not continued in Case 120 because of the poor condition of the patient and the failure to establish a good urine flow. The rest of the treatment varied in different cases as shown in the charts.

There was an elevation of the blood non protein nitrogen in all but 1 of these cases and this finding contributed to the caution observed in the administration of the drug. It is interesting to note however that this abnormality was not associated with excessive drug retention or with a high degree of acetylation of the drug in the blood, except temporarily in Case 131. In that case and also in Case 125, the blood nonprotein nitrogen remained elevated at a fairly constant level over several

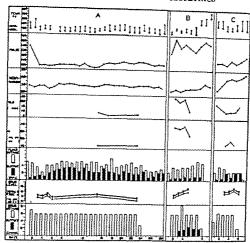


Fig. 4. Findings in 3 fatal cases. A, Case 148 B Case 123 C, Case 107

days while in Case 38 the level dropped progressively to normal. Moderate blood sulfadiazine levels were maintained in each of these cases but it was necessary to reduce the dose to avoid excessive drug retention in Case 131.

Fever tach cardia, and leucocytosis were present in each of these cases. In 3 of the fatal cases there was a steady increase in the respiratory rate. All of those patients who died had extensive tracheobronchial and pul monary lessons but evidence of some broncho-pulmonary infection was found at autops; only in Case 131. There was definite infection of the would in Case 131 and in Case 18

Other fotal cases. The findings in 3 other fatal cases of different types are shown in Figure 4. All of these patients were in shock during the first few hours in the hospital. In Case 107 (Fig. 4C) there was a burn of moder atte seventy, involving 12 per cent of the body surface but there was marked trackeobron-

chall obstruction necessitating early tracheot only frequent aspirations and the continuous administration of oxygen which, from time to time, was given under positive pressure. These procedures gave only partial and tem porary relief. In each of the other scases there were extensive and severe burns involving an estimated 30 per cent of the body surface. In Case 128 there were no abnormal physical signs or symptoms referable to the respiratory tract, while in Case 113 there was considerable respiratory distress without any definite symptoms of obstruction.

In each of these cases there was only a small urine output during the first 24 hours in spite of the administration of moderate amounts of fluid. Sulfaduame was begun at the end of the first day in Cases 107 and ently in the second day in Cases 113 and 120. The intravenous route was used for the initial dose and for an occanogal follow-up dose in the latter?

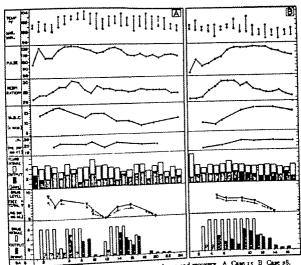


Fig. 5 Findings in a cases with fairly extensive burns and recovery. A, Case 15 B Case 38.

cases whereas oral doses were used throughout to Case 1 o

Slightly elevated nonprotein nitrogen levels were found only in Case 113 Drug concentrations were maintained at a low level in Case 128 and at moderate levels in Case 107 while the initial levels were low and increased gradually in Case 113 There was some difficulty in maintaining good urine output during the first days in each case. There was probably some water retention in Cases 107 and 113 during the last 2 or 3 days. This was evidenced by the finding of dependent edema.

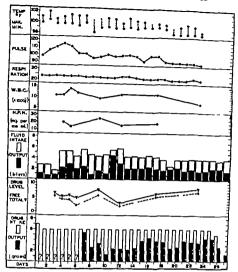
There was only minor infection found in the large at autopsy in Case 113 and some configuration from the most remainded in Case 128 for but had rather extensive tracheobronchial in pulmonary pathology. In Case 128 death occurred on the eightieth day and was attriberanted in the manufacture. The lungs in that the remained clear throughout but there was

considerable infection of the wound off and on after the first 2 weeks.

Cases of fairly extensive burns and recovery. The findings in Cases 15 and 28 are shown in Figure 5. In the former, the burn involved 20 per cent of the body surface and in the latter it involved 28 per cent and the patient was in shock at the time of admission. A good fluid balance was readily established in both of these cases. They both had only minor respiratory involvement and this was limited mostly to the upper respiratory tract.

Sulfadiazine treatment was started early in

the second day in Case 15 and during the third day in Case 28 and all the therapy was given orally. In the latter patient the therapy was maintained for about a week while in the for mer it was given with interruptions over a 2 week period. Low grade infection developed in the wounds during the latter part of the treatment and persisted for several weeks in



Flat. 6. Case r

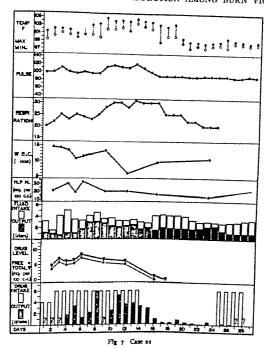
both of these cases. The respiratory tract, however remained free of infection as far as could be determined.

Cates of sever respiratory tract damage and surface burns of moderate extent. The data in 3 such cases. Cases if 22 24, are shown in Figures 6 7 and 8 respectively. The burns involved 16 per cent of the body surface in Case 11 6 per cent in Case 22 and 14 per cent in Case 24. While a small part of the burns were deep in the first 2 cases, most of the involved areas in Case 24 proved to be third degree burns. None of these patients were in shock. Each of them received 2 5 to 3 liters of fluid in addition to plasma during the first 24 hours. There was a small output of unne during that period in Case 24 but each of the

others excreted more than a liter during that time.

Full oral does of sulfadiazine were started abortly after admission in Case 17 and on the second day in the other 2 cases. This treatment was manufained for more than 3 weeks in 2 of the cases while in Case 22 it was interrupted after 2 weeks and then given again for a few days after an interval of a week. The blood levels in these cases remained fairly low most of the time. This may have been due in part, to the fairly large amounts of fluid taken by these patients throughout most of this period. There was no significant increase in the blood nonprotein nitrogen in any of these cases.

Each of these 3 patients had some fever and elevated pulse rate. The fever was low grade



and declined steadily during treatment in Case 11 and the patient raised some purulent and ristly sputum containing staphylococid pneumococci and inducenta bacilli (Table VII). During this time there were diffuse musical and crepitant rates limited mostly to the lung bases but there were no extensive areas of consolidation. There was also alight infection of the wound which was first noted during the latter part of the second week. In Case 22 the temperature and pulse rose during the latter half of the first week and remained.

elevated for 2 weeks During this period there

were definite signs of consolidation and massive atclectasis of the left lower lobe and the patient raised moderate amounts of muco purulent sputum containing many pneumococci and staphylococi (Table VII). The physical signs and abnormal x-ray findings persisted for more than 4 weeks and cleared only gradually thereafter. There was no definite infection of the surface burns.

In Case 24 on the other hand there was moderate infection in the deeper burns. This was accompanied by fever and leucocutosis which began during the end of the first week, connection with its topical use but it has either been taken for granted or ignored by most observers with respect to systemic administration of the sulfonamides. The latter too requires careful and individualized atten tion to details if one is to use these drugs intelligently and be able to assess their true value. These difficulties and the failures of chemotherapy with the sulfonamides which are now available justify a continuation of the efforts to obtain less toxic and more readily controllable as well as more effective agents.

In the present cases it is not possible to give

any true evaluation of the effect which chemotherapy had in preventing or limiting infec There are of course no controls for comparison Indeed there are few similar groups of cases with which such comparisons can be made. At the Massachusetta General Hospital emphasis was placed on strict aseptic technique and eschar producing agents were scrupulously avoided. In this hospital on the other hand aseptic precautions were not rigidly enforced and tanning agents and dyes were applied to the burned surfaces in many of them Nevertheless, the frequency and severity of the wound infections were appar ently quite similar in the Cocoanut Grove cases at both institutions. Whether or not infection of the wounds would have been more severe had sulfonamides not been used at all can only remain a matter of conjecture. The almost complete absence of septicemia, lymphangitis and extensive cellulitis beyond the confines of the burned areas in spite of the extensive and severe lesions may probably be attributed in part at least, to the systemic use of these drugs. Local infections limited to the burned surfaces on the other hand were certainly not prevented. In this respect the results are similar to those obtained under the more carefully controlled condition in the study summarized in Meleney's report (5)

With respect to the respiratory finjuries, on the other hand the comparatively small number of severe pulmonary infections can probably be attributed directly to the use of the sulfonamidies. The fact that so few of the patients with severe respiratory damage died after the first few days coupled with the additional fact that those in whom death occurred after the first 2 or 3 days, had extensive surface burns, can be taken as an indication that pulmonary infections were kept in check. It may be expected that the sulfonamides might have a similar beneficial effect in preventing or controlling the late infectious complications of other pulmonary irritants such as those used in chemical warfare or those sometimes encountered in industry. In 2 other dasasters in which respiratory tract complications occurred from fire or irritants or both, pulmonary infection was a major factor in all of the deaths which occurred after be first 2 to 3 days (z 7).

The organism which was most frequently encountered in the infections of both the wounds and the respiratory tract was Staphy lococcus aureus. Most strains of this organism are only alightly susceptible to sulfonamides. Prolonged treatment with the maintenance of high blood levels are therefore probably essen tual if infection with these organisms are to be controlled Once the necrotizing action of these organisms has occurred and purulent foci become established, such treatment, if successful probably serves only to limit the spread of infection until the exudate is evac uated or local healing takes place. The low sulfonamide blood levels generally obtained both in the cases at this hospital and in those at the Massachusetts General Hospital as well as the failure to pursue the treatment adequately may have been important factors in limiting or minimizing the effectiveness of the sulfonamide drugs. The reasons for the failure of sulfonamides to control the growth of bacteria in surface wounds have been adequately discussed by Lyons (3) and Melency (5) among others

It is possible that penicilin would have been more effective in many respects. Even with this agent, however it is now recognized that small doses such as those used at the Massachusetts General Hospital are totally inadequate even for prophylaxis of infection when the Staphylococcus aureus or the other usual wound contaminants are concerned Larger and more frequent doses may be more effective but this still remains controversial (1 6). It is of interest that even hemolytic streptococci were grown from some of the

1

wounds in spite of the use of sulfadiaxine at both institutions and the added use of peni cilin at the Massachusetts General Hospital Larger doses of penicillin might have been expected to prevent the growth of this organ ism in the wounds

The chief advantage of penicillin which re mains undesputed at this time is its almost complete freedom from toxic side effects when given systemically and probably also when it is used locally in moderate concentrations. This agent is also more effective against the staphylococcus and against many other gram positive organisms. These attributes are reflected in the improved general condition of the patients with severe and deep wounds after they are adequately treated with peni rillin (a) The limitations of the value of peni cillin he in its failure to control the growth of many local wound contaminants and these contaminants may serve to reduce its effec tiveness. It is to be hoped that other antibiotics will be found which are just as innocu ous to the host but are more effective against a larger range of organisms.

One point of interest which was brought out in the analysis of the present cases may be mentioned briefly namely the prognostic agnificance of high fever and high leucocyte counts in patients with extensive burns. Al most all of the patients whose temperatures were over 104 degrees during the first few days Likewise the mortality was high among those in whom leucocyte counts above 15 000 were obtained during the first week after the hurns were sustained

### SUMMARY AND CONCLUSIONS

The available data concerning the use of sulfonamide drugs in the patients admitted to the Boston City Hospital from the Cocoanut Grove fire were presented Chemotherapy chiefly with sulfadiazine was given only systemically for the purpose of preventing or controlling infection of the surface burns and of the respiratory tract. The management of the chemotherapy in many of the cases was complicated by the presence of shock and by the inadequate urmary output resulting from this or other causes Treatment was con

tinued in what are usually considered to be adequate doses for an average of 11 days Blood levels were often irregular and were usually lower than those which might be considered desirable. Toxic effects were comparatively infrequent and mild.

It is not possible to evaluate properly the effects of the chemotherapy in the present cases Infections of deeply burned areas oc curred after the first week and were fairly frequent but not severe. Extension beyond the burned area was observed in only i case Staphylococcus aureus was obtained quite regularly from the infected area and was usually the predominant organism. Hemolytic streptococci and various gram negative bacilli were also cultured from most of the wounds. The virulence of these organisms and their significance with respect to the wound healing varied considerably but was not possible to assess.

Pulmonary infections were few and usually mild There was some evidence of infection in the lungs of the fatal cases, but extensive pneumonia was found in only 2 of them Other patients had protracted respiratory symptoms and physical x ray signs in the lungs with fever and leucocytoms. It was difficult however to determine to what extent pulmonary infection was responsible for these manifestations since similar signs and symp toms were noted early in most of the same patients and resulted from the injuries which were sustained Furthermore most of these nationts also had extensive surface burns, and infections of these areas contributed to the fever and the leucocytosis. On the whole it was considered that the chemotherany was responsible at least in part, for minimizing pulmonary infection and for preventing de layed deaths from pneumonia in many cases

### REFERENCES

land I M 1943 229 701

<sup>1</sup> CHURCHILL, E. D. Ann. Surg., 1944, 190 268.
2. PRICKER B. and GOLDSCHULD E. Frankft. Zichr

Path, 1970, 33 III
J. Lyong, Casar Song, Gyn, Obat. 1943 74 571
J. Lyong, Casar Song, Gyn, Obat. 1943 74 571
J. Hen, J. Ann. M. Ass., 1943, 183 1907
J. Hernerry F. L. Ann. Song 1945, 183 177
J. Hernous, H. H. Ann. J. Roman, 1950, 85 517
N. Hornous, H. H. Ann. J. Roman, 1950, 85 517
Samon, S. C. Haan, T. H. and Piersmyo E. N. Eng

TABLE III -- SHOCK IN RELATION TO MORTALITY-125 CASES

Degree of abook	Number	Livel	Died	Per cent	wounds or
None*	57	51	6	to 5	portionate
Moderate	35	34	11		in mind th
Serere	33	13	20	31.4 60.6	compensate
Come, no apparent about, blo industs, blood pressure selec- shock tresses.					blood from
recre, sheet pressure below.	ye, pulse ab	PF 80,	<b>ebjecti</b>	TR SEEM OF	relatively

ound shock mortality is more than 60 per

It is not within the scope of this paper to discuss the complex and still ill understood phenomena of shock. But there are certain features that have impressed us and are worthy of mention

1 A dinical picture impossible to differen

trate from shock is produced by severe con tamination of the peritoneum with the content of colon or distal ileum. There are few cases in which blood loss has not also been a factor Frequently however the degree of shock ex hibited is out of all proportion to blood loss and in most of these cases contamination with colon organisms has been a prominent feature. Burbank has taken hematocrit readings on some of these cases and has found a significant hemoconcentration when blood loss was not marked, near normal hematocrit readings when hemorrhage was combined with con tamination in the production of the shock meture bemodilution when hemorrhage has been the major or sole etiologic factor We have not, as yet, had sufficient opportunity to confirm these findings but they may be of considerable importance in determining the relative amounts of blood and plasma that are optimum in the treatment of a given patient.

VELY STAVE When there is relatively little spillage of colon content, when the perforations are entirely comined to the upper intestinal tract, or the lenous are chiefly or entirely of solid victra, shock is relatively proportionate to blood loss. Unsplinted fractures of major

A constant observation has been that in those

patients in whom contamination is the major

or the sole cause for shock, response to re

placement therapy is usually slow or non

enstent. In these patients the prognoma is

long bones or disturbances in cardiopulmopary physiology due to associated chest to blast may disturb this prorelationship. It must also be kept at it is possible physiologically to e for loss of unwards of a liter of the circulation especially if this s slowly The additional loss of small quantities of blood may rapidly induce a state of profound shock is well to keep this in mind when considering the replacement of blood loss for the nationt faces in every case additional blood loss inevitably associated with major surgery which may prove rapidly fatal if difficulty is encountered in controlling bleeding from a major vessel.

3 Fatal peritonitis has been rare except in those cases in which contamination has not been a major factor in the production of shock From 1 to 3 hours spent in treating shock is well spent as long as there is continued improvement. The working rule on which we have tried to proceed is as follows Rapid infusion of whole blood and plasma is begun as soon as possible. An attempt is made to estimate tentatively the probable amounts of blood lost. After an adequate replacement of blood and plasma loss in an hour to an hour and a half's time if there is little or no response to shock therapy there must be active causative factors responsible. In the main there are four such mechanisms, most of them amenable to surgery (a) continued hemor thage usually concealed (b) severe fecal contamination of the peritoneum (c) disturbance of the cardiorespiratory mechanism from thoracic injury (d) early fulminating angerobic infection with gas-forming organ Blast injury to viscera and massive evisceration less frequently prevent response If there is no response to shock therapy or if response has begun but is interrupted and the patient's condition begins to deteriorate. operation is begun without delay

The opinion that massive transfusion of whole blood is essential to the adequate re suscitation of shocked patients cannot be escaped Plasma has frequently been given in installations first receiving the patient, but is used by us as the initial fluid for replacement



Except in certain desperate cases the wound was closed in layers continuous fine catgut was used in the peritoneum interrupted cot ton sutures in the posterior and anterior rectus sheaths. The skin was not closed in any case with perforation of a hollow viscus, as it is our opinion that in most instances wound sensus originates in the subcutaneous areolar tissue. Coarse mesh vaseline gauze was laid beneath the wire sutures to keep the skin margins apart during the first few postoperative days. A request has been made that these wire sutures be left in place 21 days. No attempt has been made to wall off the operative in casion from the extenorized colon. If there were no hollow viscus perforation the skin margins were approximated with interrupted cotton sutures widely placed. The results have been most satisfactory There have been no wound dehiscences in the subsequent 100 patients. Cosmetic results have not been optimum but it has not been necessary secondarily to close the superficial wound.

In exploring the peritoneal cavity an attempt is made to retrace the course of the missile. Radical shifts In position of viscera particularly small bowel that may occur subsequent to passage of the missile through the peritoneal cavity should be kept constantly In mind. The blood in the peritoneum is removed by suction and the large clots frequently present both manually and by secoping them out with lapartomy packs. No attempt is made to remove the blood completely because we believe that such a maneuver is manifestly futile and that the blood left acts as an autotransfusion no mat

tion concealed between the leaves of the mesentery which are likely to be overlooked and are troublesome to close. Particular attention must be paid to the retroperatoneal surfaces of the viscera fused to the posterior parietes. The ascending and descending colons are mobilized and their posterior sur faces inspected if perforation from behind is at all likely. In the same way the duodenum is mobilized by lateral incision and retracted medially to expose its posterior surface. The posterior surface of the stomach is exposed through the avascular gastrocolic omentum or through the transverse mesocolon. The most likely areas for overlooking perforations are thereby exposed. The 2 following cases are illustrative

CASE 2 An American soldier aged 27 years was admitted 6 hours after sustaining a wound by a mor tar fragment that entered the left 10th interspace in the anterior axillary line, the fragments were palpable posteriorly above the crest of the left flium The missile had passed through the diaphragm below the pleural reflection, perforated the splenic flexure and entered the retroperitoneal tissues above the left kidney An anterior perforation was closed after great difficulty was encountered in exposing and mobilizing the splenic flexure. Proximal defunctioning transverse colostomy was performed The patient died on the 9th postoperative day fol lowing a stormy septic course. At autopsy there was found a small perforation on the posterior aspect of the descending colon which had not been closed and drainage from which was responsible for a tremendous phlegmon of the perirenal tusines and the tissues of flank and lower chest

The extension of this incision through the left rectus and obliques in order better to expose the splenic flexure would have allowed of its complete mobilization and extenoriza

perforation of the portion of the descending colon between the mesenteric leaves

Whether a small perforation of the colon was missed or whether there was subsequent sloughing of the colonic wall in the area of contusion is not definite. In any case there was an error in judgment. The descending colon should have been exteriorized.

Except for conduction of secretions of liver kidney and pancreas to the outside no attempt has been made to drain the peritoneal cavity

That the incidence of involvement of the various viscera is roughly proportionate to their displacement is borne out in Table V Complex injuries to numerous viscera is the rule, and the contribution to mortality made by each defies statistical analysis.

TABLE V -- INCIDENCE OF INVOLVEMENT OF THE VARIOUS ORGANS-130 PATIENTS

Stomach Duodenum Small Intestine Colon Rectum Liver Gall bladder	20 6 55 57 9 34 3	Pancreas Adrenal Bladder Ureter Urethra Diaphragm Appendix	
Gallbradder		Appendix	
Spicen Kidney	14	Vena cava	
Kidney	34		

Hollow viscera Perforation of a hollow viscus was found in oo cases with a mortality of 38 per cent (Table VI) The tearing action of high explosive fragments tends to produce large lacerations from which spillage of in testinal content is great. The contractile action of the bowel tending to close small perforations minimizes the amount of spillage which in lesions less than i centimeter in diameter is usually very slight.

Except for the technical difficulties of approach to the gastric fundus, especially on its posterior surface perforations of the stomach have proved to be relatively benign. Since high gastric lessons are frequently associated with thoracic involvement we have preferred whenever possible to approach them through the chest.

The survival rate of patients with lesions of the duodenum is very low not so much apparently because of factors intrinsic in the duodenum but because of its location near great vessels the pancreas the biliary tree

stomach, and colon which tends to make for very complex situation Duodenal closur even of large lacerations on the posterior no peritonized surface has given little difficulty None of these closures has subsequently leaked to produce duodenal fistula.

There has always existed among militar surgeons firm prejudice against resection o small intestine, founded on previous ex perience that few survived Although 11 complete agreement that simple closure i always to be preferred to resection we have encountered no difficulties with resection per se. We have preferred end to-end anastomosis chiefly because it has been more rapidly and simply accomplished. With the peritoneum already contaminated closed ascptic anastomosis has seemed an unnecessary refinement, especially since no clamps have been available that met ideal standards of length and narrowness of blades. An open two laver anastomosis has been made in each case, by use of nonabsorbable sutures in the seromuscular layers, and removal of a greater portion of the bowel at the antimesenteric border in order to achieve a lumen of greater size. Great care has always been taken that the blood supply of the suture line be adequate. In spite of the fact that all these anastomoses were made in the presence of already established peritonitis none has leaked Nor has intestinal obstruction developed at the anastomotic site. Patients in whom intestinal resection is necessary will inevitably succumb in higher percentage than those handled by simple closure but it is our impression that this is in very great part due to the greater complexity of the pathology When several large linear lacerations and transections have occurred in a short segment of bowel it has seemed safer to resect the involved segment and to make a single anastomosis than to attempt plastic closure of these several tears. Linear tears are closed in transverse direction, but great care must be taken that distortion does not male for likely intestinal obstruction later on Intestinal obstruction varying in degree has been a frequent late complication from plastic peritonitis with volvulus in most cases the sites of obstruction bearing less relationship to

the areas where perforations were closed or anastomoses made than to the areas where serosal abrasions have occurred and where the bowel has been handled a great deal during the manipulations of repair

Colon Contamination of the peritoneum by colon content is the single most lethal factor producing death in abdominal wounds (Table VI)

TABLE VI.—RELATIONSHIP OF CONTABINATION OF PERITONEUM TO MORTALITY

\elatraperitoneal perforation	Carra	Died i	or or or
of hollow viscus All intraperitoneal perforations Stomach and small bowel	31 90	38	35
perforations only Colon perforation	41 57	3 26	29 44

The principle of exteriorization of lacera tions of colon is particularly adaptable to the lesions of the colon produced by high ex plosive and high velocity missiles. Even the smallest perforation of the colon is usually surrounded by an area of ecchymosis which, when observed in the extenorized loop in variably undergoes necrosis and aloughs to the very margin of the ecchymotic area. The difficulties of estimation of the extent of this necrosus make simple closure of these lacera tions hazardous. În addition exteriorization accomplishes decompression There are cer tain situations, however in which the ex terlorization principles are inapplicable or unsatisfactory These are particularly pecu liar to the right colon large lacerations of which are likely to be accompanied by high mortality because of the liquid character of the colonic content which flows readily into the peritoneal cavity carrying with it a great concentration of organisms which are rapidly disseminated throughout the peritoneum. Exteriorization, with the suturing of ileum to perforations particularly of the cecum and proximal ascending colon have done very wel following the conversion of these wounds int. a cecostomy by suturing the colonic wal about a one inch rubber tube and securing i to the deep fascia by several interrupter sutures. When small through and through wounds have been encountered the posterio, wound has frequently been closed and th antenor wound converted into recostoriva this fashion The cecostor fashio, 122] removed between the 4th . . . . un postopera tive days and drainage has ceased a very fer days later By complete mobilization of the right colon and the hepatic flexure exterion zation with the suturing of an adequate sou can usually be accomplished in the distal hal of the ascending colon. In those long lines tears, especially in the proximal half of the ascending colon, the most satisfactory answer seems to be resection of the proximal portion to beyond the tear ileotransverse colostomy (which we prefer to do in end to-side fashion bringing the proximal hepatic flexure of transverse colon out through a stab wound.

Perforations and lacerations of the remaining colon are exteriorized through a short muscle splitting incision as far away from the primary incision and the wounds produced by the muscile as is consistent with the avoidance of tension on the bowel. To this end also attached portions of the colon are liberally mobilized A spur ideally from 5 to 6 inches in length, is constructed by the simple expedient of turning the bowel toward the center axis of the body auturing the two teniae liberae together with a single running statch of catent. Portions of the transverse colon used in making this sour are denuded of their omental attachments. The colostoms thus constructed is opened immediately following operation.

remove them at the initial operation unless they are readily available protruding from the liver surface

Solcen The gunshot wounds of the spleen have exhibited one striking feature different from the usual experience with closed traumatic rupture of the spleen unless there is a wound of the great vessels near the hilum of the spleen they do not continue to bleed No satisfactory explanation for this alteration in the usual pattern presents itself Extensive laceration, even fragmentation of the spleen with free portions becaused into the thorax or free in the peritoneal cavity have been a frequent finding. There is usually considerable free blood in the peritoncal cavity but the spicen itself as encountered at operation is either not bleeding at all or gently oozing Shock is no more frequent in splenic injuries than in unjuries of other abdominal viscera. The following case is typical

CASE 4. An American soldier aged 24 years wa admitted 514 hours after sustaining a wound over the left rith rib in the anterior axillary line by a mortar fragment. Two units of plasma were given prior to admission. He was not in shock, blood pressure 110/80 pulse 100. The abdomen was boardlike Stomach contents and urine were nega-At operation the abdomen contained estimated 1000 cubic centimeters of liquid and clotted blood. There was a tremendous laceration. of the lower half of the spleen, with a great deal of surrounding ecchymosis of the ligaments of the spleen but no active bleeding. The disphragmatic origin was torn below the pleural reflection. Splenec. tom; was performed and the disphragm repaired Except for transient atelectases of the left lower pulmonary lobe he made an uninterrupted con valescence and was returned to full duty on the 25th postoperative day

In considering civilian experience in the frequency of secondary hemorrhage following rupture of the spleen we have performed splenectomy for all but the most extremely minor facerations. The only such case in which it was felt that the slightly fractured spleen could be safely left in had no further difficulty with the aplien during the short period we were able to follow his progress bylenectomy in cases in which the spleen was the sole abdominal viscus damaged has not resulted in death or severe complication in a single case (Table VII). The transitioracci approach has delighted us in the case with

TABLE VII --- NORTALITY FROM EPILINECTOMY

**************************************	Canco	Dratin	New Count.
Transphrenic	Q.		•
Drom below	5	4	80
Total	4	4	
"These deaths are due to extens and plants by hollow races constant	ne continue	stien of p	erten en

which spleuectomy may be performed. If there were no penetration of the pleura, or if the pertoneal pathology were not approach able through the diaphragm the transvene subcostal approach has been used whenever practicable. This series includes a patients who have returned to combat duty within 6 weeks after splenectomy.

Andrew ureler and bladder Wounds of the kidney have been seen in 24 patients. In cases with extensive extravasation of blood about the kidney sufficient dissection was carried out to visualize the Lidney As with liver and spicen the renal parenchymal substance has not continued to bleed except for moderate coxing unless the wound were near the hilum involving the major blood supply Even though there were extensive fractures through the renal substance with portions of the Lidney torn completely away and a major calva involved the treatment has been con servative. Adequate drainage has been established to conduct the urine to the outside Drainage of urine in these patients has continued for a very long time. Microscopic blood and sterile pyuna have required weeks to disappear Plastic reconstruction of the kidnes by débridement and suture has not scemed indicated. The following case is illustrative of the tremendous powers of bestme of the conservatively treated kidney

CASE 5. A Japanese American soldier aged 27 years sustained a perforating wound from an articlery frequency that passed through the right fank. He was admitted by boots the administration of complete the production of the administration of complete the production of the administration of complete the production of the standard production of the passed of the passed and the liver away almost completely transacted the mid seconding colon and carried saw the lower third of the right kidney into the lower major callys. Neither liver not kidney was beed ag. The tora colon was exteriorized and the hepatic and rend areas drained through the large debtied pasterior wound. Livery is a production of the pasterior wound.

for a low grade fever early convalencence was smooth. Urine and bile drained in large amounts through the posterior wound. Six weeks later he was seen at the general hospital in the base still draining bile stained material in small amounts from the small posterior sinus otherwise in excellent general condition. Retrograde pyelograms at this time were normal except for very slight distortion of the inferior major cally. He stated in a letter almost a vear later that he was on limited duty status in a rearward area. Jeeling fine.

Nephrectomy has been performed in 6 instances (25 per cent) in each case because of severe intractable bleeding

Only I lesion of the ureter has been en countered in our personal experience in this case associated with severe damage to the kidney to which the only answer was nephrec tomy. We know of no case in which there has been sufficiently, slight damage to the ureter to permit of successful plastic repair.

Perforations and lacerations of the bladder have been closed. In certain instances, especially when the missile has passed through the floor of the bladder or its anterior wall the dissection in the prevesical spaces has been extensive and the repair difficult. A suprapulic cystostomy tube has been sutured in place for urnary drainage. In many instances indwelling urethral catheter drainage might have sufficed, but the difficulties of maintaining the catheter in place during transportation have made cystostomy the more desirable procedure.

Great vessels The initial attitude toward the problem of retroperatoneal hematoma was conservative in accordance with the accepted attitude toward the retropentoneal hema tomas of crushing injury of civilian experience. Unless there was continued bleeding the hematoma was left severely alone. An early unfortunate experience (Case 6) which has been repeated in the experience of others has made us more vigorous in exploring these hematomas and in ligating large bleeding vessels, more to avoid the late complication of suppurative thrombophlebitis with fatal sepuc infarction of lung than to avoid secondary hemorrhage This has seemed particularly indicated in instances in which the retroperi toneal hemstoma communicates through the missile track with the contaminated peri

toneum and especially when the missile passed through the colon in its course towa the posterior parietes. This attitude h seemed profitable

Case 6 An American soldier aged 21 years w admitted 6 hours after fragments from an aer bomb had caused superficial wounds of the right ar and a penetrating wound of the mid-epigastriur The small missile had passed through the mi transverse colon produced numerous rents a perforations in a segment of ileum a foot from th ileocecal juncture and passed into the retrope toneal tissues to the left of the midline about a cent meters above the origin of the inferior vena cav The large retroperitoneal hematoma was not a creasing in size There was severe contamination the pentoneum and the intraperitones! bloo Resection of a segment of the small bowel with end to-end anastomosis the transverse colon exterio uzed the retroperatoneal hematoma not disturbe For the first o days convalescence was satisfacto except for a low grade fever which was first though to be due to malaria when parasites were found o examination of the blood. At the evacuation hospi tal he developed an abscess about the posteriorly placed missile lateral to the vertebral bodies which had not been removed. Following the drainage o this absects he developed severe ileus high fever jaundice with marked enlargement of the liver Death on the 47th postoperative day from a suppurative thrombophlebitis of both femoral veins and inferior vena cava with multiple septic infarcts to lungs and liver

Exploration of the retroperitoneal tissues might have required ligature of the inferior vena cava, but the removal of the missile and avoidance of the subsequent abscess would probably have saved the patient.

We know of no patient with an aortic wound who has survived to reach the oper ating table although 2 patients with aortic wounds have succumbed shortly after their admission to our hospital Lesions of almost every other great vessel have been encoun Associated with wounds of large vessels is a particular syndrome which it may be well to describe. If the patient has been in severe shock on admission he may make an excellent response to replacement therapy up to a certain point, attaining a blood pressure of perhaps oo systolic. Or the shock picture may have been slight and response to shock ther apy prompt Immediately however upon the opening of the peritoneum the blood pressure drops to zero with the release of the hydro-

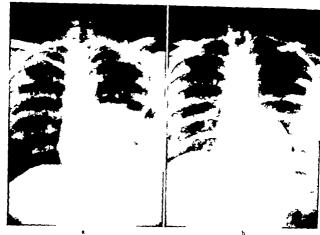


Fig. Case J. Left thoracoabdominal wound a, Preoperative critical roentgenogram of the chest abox ag atomach bernstated through the large rent 1 the dusphragm, fractured spicen abox—and medial it the atomach allerit

hemopseumothorax. b Vertical mentgenogram of the chest 36 hours after thoracotomy shorting complete reexpansion of the lung the storach reduced, the disphragm transied.

static pressure of the collected blood within the pertoneum sustained by the pressure of the abdominal musculature. After ligature of the vessel there is usually prompt recovery from the hypotension. Distention of the abdomen with blood with slow or no responsato replacement therapy is a most omnous sign and usually results from a rent in an artery of large caliber. Collected experience has indicated that the great veins may be ligated with impumity, including the inferior vena cava up to the level of the renal veins.

#### THORACO ABDOMINAL LESIONS

For purposes of this discussion thoracoabdominal lesions are limited to those in which the missile has passed through both pleura and diaphragm. Combined thoracic and abdominal cases in which there is associ ated injury to the chest by one or more other fragments are excluded as are those periors tons of the disphragm beneath the pleural reflection. There were 31 thomosabdominal injuries in this series, an incidence of 24 per cent. The mortality of this group was 19 per cent, slightly lower than the general mortality of the entire series.

Thoracoaldominal lesions form the most requent indication for major surgical in vasion of the thorace cavity by definitive thoracotomy. It is beyond the scope of this discussion to consider the indications for definitive thoracotomy in detail. Our present attitude may be summed up as follows. The repair of the disphragm is much more readily accomplished from above and the repair achieved is likely to be much more secure. If there is a sucking wound or extensive dam.

age to the thoracic wall especially when the thoracic wound is below the 7th interspace affording satisfactory exposure of the dia phragm by extending the incision necessary to debridement of the wound the disphragm is repaired from above. This approach is especially appropriate if the pathological condition likely to be encountered can be entirely repaired through an extension of the wound in the diaphragm We have been gratified to find how readily subphrenic organs are approached by the transphrenic route. As has been previously stated the removal of the spleen is much more readily accomplished from above than from below and the same is obviously true of the atproach to the gastric cardia and fundus and the entire posterior surface of the stomach. Nephrectomy can be accomplished readily through a low thoracic approach either on the right or the left. The spleme flexure of the colon is readily mobilized and extenorized through a subcostal stab wound if perforated The small intestine may be explored through the left diaphragm down to the distal reaches of the ileum

Although there has been general agreement about the necessity for closure of the left dia phragm to prevent subsequent herniation, we are of the opinion that it is fust as important to close the right diaphragm, if there is a lesion of any size in it, to prevent the drainage of bile into the pleura from the liver wound which is almost invenably associated with lesions of the right diaphragm. Continued flow of bile into the pleura produces an in tense chemical pleuntls causing transudation of a great deal of fluid into the pleura requir ing aspiration for a very long time. Total empyema is likely to result. The objection that the presence of the liver precludes exploration of the subhepatic areas has not proved a valid deterrent. Nephrectomy has been accomplished through the right dia phragm as readily as through the left. The liver may be retracted to the left, thus expos ing the gall bladder the hepatic flexure and proximal transverse colon the duodenum and biliars tree

The frequency with which the abdominal and the thoracic approach has been selected

TABLE VIIL—THORACOABDOMINAL WOUND ROUTE OF APPROACH—31 CASES

Route of pproach	Casette	Died	Mart per
Thoracatomy alone	æt	1	ĭ
Celiofomy alone	4	3	5
Thoracotomy plus celiotomy	5	•	4
Not operated	t	0	
Total	31	6	1

is shown in Table VIII In those cases which both thoractomy and echotomy in be done we have preferred to do the che work first in order to restore the pulmona physiology to as nearly normal as possibefore proceeding to the more shockir celestomy.

The phrenic nerve has been crushed when ever it seemed desirable to achieve phren paralysis to quiet the disphragm and to favo its healing. This fact has seemed particularly indicated when there was an extensive woun of the diaphragm especially in those cases i which the diaphragm was avulsed near it origins for a considerable distance. Phreni repair has usually been accomplished in two layers by overlapping the leaves of the dia phragm a centimeter and securing the closure with interrupted mattress sutures throughout Every effort has been made to achieve rapid complete re-expansion of the lung following surrery The most successful plan has been to institute water trap drainage of the chest through two tubes an upper one in the anterior and interspace another in the posterior axillary line usually in the 7th inter space. The lung has been re-expanded under positive pressure by the anesthetist prior to completing the last sutures in the thoracotomy closure. The tubes have been removed after they have ceased to function when the lung has come out against them usually in 48 hours. In many instances the chest has re mained completely dry (Case 7) although frequently from 1 to 4 daily aspirations have been necessary. Aspirations are continued until less than so cubic contineters are obtained.

CASE.7 An American soldier aged stycans was admitted 455 hours after sustaining wounds of both chests from artillers fire not in shock with blood pressure of 1507 pulse of 180. The missile had entered the right posterior chest over the 10th rib

just medial to the posterior axillary line and exited through the left chest fracturing the 8th and 9th ribs This wound was sucking markedly There was a small amount of blood in the gastric washings The x ray film (Fig. 12) showed the stomach berniated through the left disphragm into the left thorax. Thoracotomy was performed by excising an additional length of the oth rib The fractured spleen was herolated with the intact stomach through a large rent in the diaphragm and there were several free fragments of spicen, comprising about half the spleen in the pleural cavity. The remaining spleen was not actively bleeding. Splenectomy was performed reduction of the berniated stomach and repair of the diaphragm with two rows of interrupted cotton sutures. After the pieural toilet was completed the lung expanded readily with positive pressure except for the lower border of the lower lobe where there was a short laceration which was not bleeding. The chest was closed and a tube left in the 6th interspace in the posterior aziliary line another in the and interspace anteriorly, both con nected with water trap drainage. Débridement of the wound entrance with closure of the deep muscles ver the small defect in the left pleurs. The patient received a unit of plasma and 500 cubic centimeters of blood during the 70 minute p ocedare. Com valescence was smooth. Patient was sitting on the side of the bed eating a full diet on the and post operative day I may films of the chest 16 hours after operation show complete expansion of lung (Fig. 16)

#### CHEMOTHERAPY

Enthusiasm for chemotherapeusis in the treatment of perstonitis in dvillan practice has not been borne out by our experience in war surgery. The practice of administering sulfadiazine in tablet torm as soon as possible after wounding is completely contrandicated in the man with a possible abdominal wound Peristalsia and absorption cease abruptly at the time of wounding. The tablets frequently plug the guatric tube and are often recovered from the free peritoneal cavity. In an initial group of 18 cases we adopted a regimen of intensive sulfadiarine therapy giving 10 grams intravenously preoperatively instilling to to 15 grams of sulfanilamide crystals into the peritoneal cavity and continuing with 5 grams of sulfadisaine every 3 hours following operation. There remained cases of over whelming contamination which were not apparently affected by this intensive therapy We were also encountering a distressing number of renai failures and it was hard to be certain that acetylization of the sulfadiazine

with the deposition of crystals in the kidney was not a factor in producing this condition.

In April 1944, penicillin became available in sufficiently large amounts to warrant its use in cases of this type. Since that time we have used no sulfa drug. One hundred thousand units of penicillin were given intra versionally preoperatively to every patient with likely intraperationeal perforation of colon 25 000 units otherwise routinely. In those patients with severe contamination or establushed peritonitis, 100 000 units dissolved in 200 cubic centimeters of saline have been instilled into the pentoneal cavity through a catheter directed to the major areas of contamination just prior to finishing snur closure of the peritoneum. In all patients, regardless of the presence or absence of hollow viscus perforation 25 000 units have been mutinely administered every 1 hours until the indica tion has no longer existed, frequently through out the patient's 10 day stay in our units. We have observed no difference in the pa tients who have received penicillin except that the associated soft tissue wounds have appeared cleaner. In cases of the same type patients have continued to succumb to their contamination. Renal failure has occurred with the same frequency. We suspect that if neither drug was available the result would be the same.

It should be pointed out in this connection that these views are not thoroughly concurred in by many surgeons working with these same types of cases, particularly be cause of the known inefficacy of pentillin in combatting the growth of Eschenchia coil and its allied organisms. There is sufficient holi cation that the Eschenchia coil is not the lethal organism in peritontis, but rather that the clostridi and the anaerobic streptococci are Since both of the fatter are effectively combatted by pencillin, we have left the objection to its sole use invalid. Clinical impression would seem to substantiate this view.

#### POSTOPERATRE HAN GENERT

If a shock state exists at the completion of surgery the patient remains on the same litter on which he was operated upon in the deep Trendelenburg position during the continuance of resuscitation. When all blood lost seems adequately replaced plasma infusion is continued slowly (40 drops per minute). Oxygen at 8 liters a moute is given usually by means of a soft intrapharynges! catheter Blood pressure and pulse readings are recorded by the nursing staff at half hourly intervals until stabilized at normal for a 2 hour period when the treatment is stooped.

Nasogastric suction is instituted through an indwelling gastric catheter of No 18 F callber when available. This suction is continued until audible peristals has been resumed usually about the 4th or 5th postoperative day even when there has been extensive contamination. It was early recognized that these patients stand the administration of electrolytic solutions poorly tending to develop pulmonary edema. The following case

is illustrative

CASE 8 An American soldier aged to vests was admitted 2 hours after sustaining a penetrating wound of the left flank and abdomen by small arms fire in profound shock, blood pressure and pulse unobtainable. Response to infusion of two units of plasma and 1500 cubic centimeters of blood was slow and the blood pressure a hours later was 70/40 although the pulse was 88. Operation was under taken immediately. There was an estimated 2000 cubic centimeters of blood in the peritoneum only slightly contaminated. The missile had entered through the leaves of the mesentery of the descend ing colon at about its midpoint perforating it tan gentially extraperatorically passed through the upper jejunum and entered the retroperatorical tissues. There was a long laceration of the left common iliae vein which was bleeding briskly. The vein was doubly ligated above and below the rent. The jejunal perforation was closed and the descending colon exteriorized. Although 2000 cubic centimeters of blood was given during the procedure he was in severe shock at its close but over the next 12 hours blood pressure and pulse were stabilized within normal range of values. There followed a days of ver) satisfactory convalescence with slight fever although the pulse remained above 120 and there was moderate oligura the urinary output reaching 500 cubic centimeters on the and day. On the third day an hour after the completion of the infusion of 1000 cubic centimeters of dextrose-saline and 1 unit of plasma at 40 drops a minute over a 335 hour period, he developed sudden severe dyspnes cyanosis diffuse moist rales over both lung fields and rapid thread) pulse Because of the sudden char acter of the onset the known injury to a great vein and the absence of dilutation of peripheral and neck

veins a subjethal pulmonary embolus was susp.
After temporary improvement, 13 hours ' \* developed fulminating pulmonary edema .
and died The sole indings at autoray were wet, edematous lungs and a markedly '! fiabby edematous heart. There were no anterment clots in any of the great veins. The personaum 'smooth and glistening throughout and the jeju perforation well closed.

This case is illustrative of the caution  $\omega$  must attend the administration of fluids patients who have been in marked shock severe cardiovascular instability

Departure was therefore made from the usual regimen of replacing fluid loss in t presence of gastric suphonage. No fluids a given until a 24 hour interval has elap after the recovery from shock and fluids a then begun cautiously. A drip apparatus introduced into the system and the admini tration rate kept at 40 drops a minute. C unit of plasma is added to each thousa. cubic centimeters of dextrose solution to aid maintaining plasma proteins. After twenty four hours hematocrit, plasma protein heme globin and red blood cell determinations ar made and the relative amounts of blood plasma given are guided by the presence c hemodilution or hemoconcentration. Carefu records are Lept of the urmary output so as t provide a further guide in the admin\_+-of fluids

Pulmonary complications are particularly troublesome in this type of case and exprecaution must be taken to prevent the accumulation of bronchial secretions pulmonary atelectasis. The active measures taken to this end are

r Careful suction tollet of the tracheobronchial tree at the close of anesthesia with

bronchoscopic suction if indicated

2 Frequent turning of the patient man ual support of the abdomen with insistence that he cough. The nursing and enlisted personnel on the wards have become particularly proficient in this maneuver.

3 Avoidance of excessive sedation de-

pressing the cough reflex

4 Frequent inhalation of pure carbon dioxide inducing hyperpnea and cough

5 Early recognition of atelectasis by frequent examination of the nation

thrombophlebitis likely Every possible measure must be taken to prevent this complication, especially early and frequent change of position and as early mobilization as possible. We have recognized thrombophlebitis in only a patients of this group, and none has developed massive pulmonary embolus.

As soon as peristalsis has begun again and the duodenal tube is removed the patient is placed on a general diet. During the early postoperative period intravenous vitamin supplement is routinely administered ascor bic acid in 300 milligrams didily dose the complex, and vitamin K. This therapy is continued by mouth as soon as it can be ingested. In spite of these measures there is usually visibly rapid nutritional depletion of the patient who may already have suffered considerable depletion resulting from long weeks in combat.

Early experience in the African campaign demonstrated that patients who have under gone major surgical procedures or who are suffering from peritonitis do not stand transportation within the first few days of opera tion. Ten days has been set as the minimum ideal time for evacuation. At the end of this time many are afebrile, eating a full diet, and have begun to sit in a chair beside their cots. Under the stress of a rapidly moving front, and occasionally when evacuation of the hospital has been forced by enemy shell fire it has been necessary to evacuate patients earlier. The average time for evacuation of this entire series was to 7 days.

#### DISCUSSION

I'ms opportunity to observe the pathology and altered physiology produced by the rapid flooding of the pentoneal cavity with the content of colon or terminal lieum has brought to our attention a pattern of events so uniform in their fatal characteristics that we prefer to speak of it as the syndrome of overwhelming contamination. Typically the patient is admitted in a shock state which responds slowly and incompletely to replacement therapy. When the pentoneal cavity is opened there is a large amount of foul smelling fecal stained blood. The pentoneum is stained a purplish brown has a grayish cast

is lustreless and there are areas of intense hyperemia particularly over loops of small intestine Fibrin deposition has not as vet begun The patient usually goes into deep shock during the operation from which his recovery is slow and frequently never complete. In spite of the continuance of plasma administration, he develops an intense hemoconcentration with evidences of markedly alowed circulation of the peripheral capil lanes. The blood pressure gradually fails the pulse rate rises, and death occurs in the first 24 hours. In those patients who survive for a longer period reaching the 3rd or 4th day there is invariably pulmonary edema. Large amounts of frothy fluid well into the trachea which they are too weak to cough up and which it is difficult to remove sufficiently well by intratracheal suction. Fever is rarely high before death occurs between the 3rd and 5th postoperative days. At autopsy one is especially impressed with the fact that the peritoritis has continued to improve. In fact in certain cases there is the very minimal evidence of pentonitis-a few areas of pen toneum that have lost their sheen a few flecks of fibrin. Unless there is continued leakage into the peritoneum a true fibrinopurulent pentonitis is not seen. In certain of these cases peristalsis may have been reestablished prior to death diet tolerated and the colostomy may have begun to function The major gross pathology is in lungs and heart. The lungs are intensely wet, water logged the bronch; full of thin frothy fluid Certain areas of atelectasis and pneumonitis may be present but the picture is chiefly one of edema rather than pneumonia. The heart is invariably very edematous chiefly in the subspicardial layers, the my ocardium pale and flabby the entire heart dilated especially the right ventricle.

There occur certain instances in which there is massive spillage of colon content in which there is not this peritonical staining Usually the feces is solid in these patients. There is usually intense hyperemia of the peritoneum and a punform caudate with little odor. These patients live. The others die Although it is undoubtedly important it would seem that the picture bears little.

abdominal cases than in other severe in juries. The one most striking feature seems to be that almost all have been for long periods in extreme hypotension states. They have therefore received large amounts of blood in the resuscitation. Only a few have shown clinical evidences of transfusion reaction and in these there has been extensive hemolysis in plasma and urine typical of transfusion reaction. Detailed studies are now being made on the problem. We feel that it has little relationship to the administration of blood and prefer to call it "shock kidney."

Further reduction in the mortality of the abdominal wounds of warfare depends chiefly upon the solution of these two problems

#### STEMMARY

- 1 Experience in the initial surgical care of 130 war wounds of the abdomen is presented. The mortality in our hands was 23.4 per cent.
- 2 Diagnosis is chiefly a problem of recon structing the course of the missile. The usual signs of pentoneal irritation are reliable. The presence of penstals is rules out intraperitoneal perforation of hollow viscus.
- 3 It is profitable to operate on every pa tient with an abdominal wound regardless of time lapse or risk
- 4. Exploratory celiotomy is rarely necessary
- 5 The degree of shock on admission is the most reliable prognostic aign
- 6 Severe fecal contamination of the pen toneum produces a clinical picture impossible to differentiate from shock. These patients respond slowly or not at all to replacement therapy.
- 7 Shock treatment is continued as long as improvement continues. It is rarely profitable to give more than 1500 cubic centimeters of blood prior to operation
  - 8 Ether-oxygen anesthesia by closed ab-

- sorption endotracheal technique is the anesthetic of choice
- 9 Although the function of the surgeon is primarily to save life it is rarely necessary to adopt compromise procedures.
- ro Resection of small bowel is preferable to multiple closures within a short segment which may distort and lead to obstruction
- 11 Extenorization of the wounded colon is the safest procedure. Perforation of the colon remains the single most lethal factor in any series of abdominal wounds.
- 12 Adequate drainage of liver wounds is essential Liver packs are rarely if ever, necessary and are productive of complications.
- 13 Solid viscera including the spleen, do not continue to bleed aignificantly from their parenchyma
- 14. Intractable bleeding from a hilar vessel and division of the ureter form the sole indications for removing the wounded kidney
- 15 Closure of the diaphragm is as important on the right as on the left.
- 16 Penicillin is no more effective than the sulfanilamides in preventing death from severe contamination of the peritoneum
- 17 Intravenous administration of isotonic electrolytic solutions postoperatively is poorly tolerated by the patient recovering from a severe shock state or combatting pentonius
- 18 Pulmonary complications must be anticipated and vigorously treated
- 19 Overwhelming contamination of the peritoneum and renal insufficiency remain the two problems the solution of which must precede marked further reduction of mortality from abdominal wounds

#### REFERENCES

- 1 BURBANK BENJAMIN Personal communication 1914 2. COLCOCK, BENTLEY P Bull U.S Army M Dept 1944 80 100-100.
- MICHELA, LEON M Preoperative diagnosis of the recently wounded abdomen To be published.

# THE EFFECTS OF PEDICLE JEJUNAL TRANSPLANTS IN THE STOMACH ON MANN-WILLIAMSON DOGS

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ANDRUS Lord and Stefko reported that when pedicle grafts of the jetunum were transplanted into the stomach wall of dogs a reduction in gastric acadity ensued in such animals following histamme injections there was a reversal or considerable diminution in the expected rise in acidity. These results were obtained particularly with jejunal transplants, although a duodenal flap caused similar changes but in a lesser degree. No effects were produced with iteal or colonic segments.

They then produced gastroduodenal ulcern tions by the injections of histamine-beesswar mixture after the method of Varco Jejunal transplants into the stomach had a salutary prepared with grafts, no ulcers formed after

histamine-beeswax injections.

Applied to humans (1) jejunal dap transplants were done in 4 peptic ulcer cases. Hyperacdity was reduced in 3 of these patients and clinical improvement without change in acidity was noted in the fourth patient.

In ulcers produced by the histaminebreswax method the beeswax is imbedded in the subcutaneous tissues. The secretogogue effect of the histamine causes continuous gastne hypersecretion. Chronic ulcers form in the stomach or duodenum in 100 per cent of cases.

Another standard method of producing chronic duodenal ulcers in dogs is the Miann Williamson operation (6) In this procedure the stomach is made to empty into the je-junum and the alkaline duodenal bule and pancreatic junces are diverted into the terminal ileum. Acid gastric julce thus spuris constantly against an area of jejunum unprotected by its normal alkaline julces.

From the Experimental Surpeal Laboratory Harper Hawdial, Destroit, Michigan. Added by great from the Messderien Fond, Perspared for prementation before secreting of Central Surpleal Society in February 945, canceled. We have done the Mann-Williamson operation on 28 control dogs whose diet consisted of left overs from the hospital kitchen. In all cases (100%) Jejunal ulcers were demonstrated at necropsy The survival time averaged 71 days. The minimal time from operation to expirateon was 13 days, and the maximum 135 days (7).

We wish to report our observations on 6 Mann Williamson dogs in which jejunal pedicle graft transplants were done (Table I) These operations were done in one or two

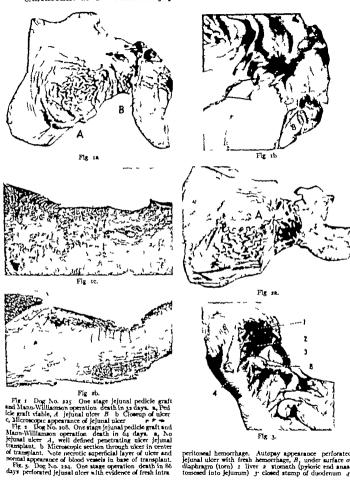
stages.

Intravenous nembutal anesthesia was used The abdomen was opened through a midline incusion A segment of Jejunum 1'5 to 2 inches long and 3 to 4 inches from the ligament of Treitz was isolated and divided Meticulous attention was given to the integrity and adequacy of the attached mesenteric blood supply

The posterior wall of the stomach was then delivered through a rent in an avascular por tom of the mesocolon and serosal sutures were placed joining the prepared section of Jejumun to the stomach. The cylinder of Jejumun was then incised at its antimesenteric border and the edges were trimmed, thus forming a flap A gastric window was fashomed to accommodate the jejumal patch, and the pedicle graft was secured in place with two rows of sutures insully silk throughout.

When the jejunal transplant was done as a first stage or preliminary procedure, the continuity of the jejunum was then re-established either with a side-to-side or end-to-end anatomosis, and the abdomen was closed

The second stage consisted of the typical Mann-Williamson operation. The stomach was divided at the pylorus, and the duodenal end was inverted and closed. The jejumum was sectioned about 1 inch dustal to the previous anastomotic site. The open pyloric and of the



peritoneal hemorrhage. Autopsy appearance perforated jejunal uker with fresh hemorrhage, B, under surface of diaphragm (torn) 1 liver 2 stomach (pyloric end anastomosed into jejunum) 3 closed stump of duodenum 4





I g. 4. Dog No. 24. Same dog as l Figure 3. a, Pedicie flap, A perforated Jejunal alter B not market jeju lits b, Cross section of vascular pedicio of lejural flap note normal potentance of blood vessels c, Section of II of pedicie flap 1 stomach not blood supply and normal potentance of II layers

stomach was anastomosed into the distal je junal segment. The proximal jejunum was then joined to the terminal ileum (8 to 10 inches from the ileocecal junction) thereby providing the surgical duodenal drainage Anastomoses were generally side-to-side or end to-side occasionally end to-end. Silk was used throughout The two stage operation was done in 3 dogs. The interval between the 2 operations was done in 3 dogs. The interval between the 2 operations was considered as a construction of the constructi

erations was 25 29 and 47 days, respectively

Because of the technical difficulties of
adhesions encountered when the abdomen was

entered a second time the two procedures were combined in one operation in 4 am ands. When thus performed the pedicle graft was fashioned into the posteroor stomach wall first. Then the stomach was divided at the pylorus and the duodenium was closed The open ends of the jejunium where the transplant has been removed were then used for the Mann Williamson anastomoses the distal one for the pyloric end of the stom ach, the proximal one joined to the terminal ileum.

TABLE I - RESULTS

		١		Laboratory data				
Deg bergerj	bergery	Services Autopry Lase dadings		7	Het Si	RBC	R D C	Days before exitus
(Fat )	One stans repend projects grad and Magn-Welkersson 5-79-44	<b>J</b> 4	Seperficial Jepanni alter podicio grafti viable	30	5	2,050	Láce	
(Fig. )	One stage operation 7-44	44	to jemmi sizer Well defined sker of pedicle transplant Pedicle blood supply O K	**	**	Q <del>iy</del> o	1,000	
(Fig. 3)	One stage operation: 3- 7-44	<b>9</b> 6	Perforated primel slow fruit ratra- pert need harmor large Pedicte transplant O h	50	"	1.10	4,974	5
(Fig. 2)	T stage operation Pudgie grat payment out steemich 44	g#	T superficial jepinal silvers Pedicis graft O K		u	,400	19,400	
	Manu Wallemoon 10-44	13	L		<u> </u>			•
(F ME 6)	Two stage operations Pedicle graft 44	57	Deep stigmal alter 14 cm diameter Podacle graft O K	u	-	1130	موقبه ا	•
	Mace Williamson 18-44	_ i				-		
(Tug 2)	Two stage operation Peakels graft p- 3-44	26	Two deep passed steers, one with per- foration. Public graf. O K				'	
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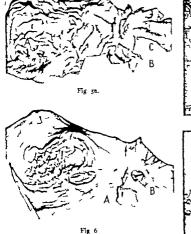


Fig 5 Dog No. 204. Two stage operation first stage Fig 5 Dog No. 304. I wo stage operation in the stage felmal transplant, second stage Mann-Williamson operation as days later; death 38 days after operation. a, Je upual transplant, A, two large evoding jedunal ulcers, B C b, Microscopic section through ulcer B Fig 6 Dog No. 305. Two stage operation jedunal transplant, Mann-Williamson operation 15 days later death 4.4 days after consensor. Felmal transplant

death 42 days after operation. Jejunal transplant, A jefunal ulcer 116 centimeters in diameter B

#### RESULTS

In Table I it will be noted that despite pedicle jejunal graft transplants all dogs ex cept one developed sesunal ulcers. The one exception dog No 208 developed an ulcer of the jejunal pedicle transplant (Fig. 2) The ulcers were identical with the ones we have been accustomed to seeing with control Mann Williamson dogs. The photographs show this There are superficial ulcers ulcers penetrating into the muscularis, and ulcers which have perforated completely form in the identical location—1/2 centimeter beyond the pylorojejunal anastomosis or slightly distal to this point as they did in our



Fig 7 Dog No 182 Two stage operation jejunal transplant and Mann-Williamson operation 18 days later death 31 days after operation. Jejunal pedicle graft, A two deep jejunal ulcers, B C one of which, B has per forated.

controls. Two of the photographs show that the blood supply at the base of the transplant (and also in the vascular pedicle) is intact.

The survival time average, 70 days was about the same 71 days as in our control animals.1

#### CONCLUSION

The healing and prophylactic effects attributed to the jejunal flap in dogs with histamine induced ulcers were not evident in 6 dogs with

worth experiment was not completed t the time this paper as subsultied. It was one stage operation dos he dog was sacraficed August 7 945, (8 most I he dog was sacrificed August 7 945, (5 mosths later) 1 which there was 37 per cent weight loss and the dog was almost moribus topsy showed large well sourshed pedicle graft. The jujunum s

the Mann Williamson ulcers. Ulcers formed eroded and perforated in spite of viable grafts. The seventh dor was sacrificed 8 months after operation. There was no ulcer present in this animal

North Since this work has been completed, to articles have appeared testing the value of pedicled jejunal trans-plants on gastric acidity Kolouch, Dubus and Wangenpaints on gasine seemly recover, Duton and reagant steen reported that the histamine effect was not reversed in pedicic transplant dogs, as Andrus and associates had found. Also, when daily i tramuscular injections of hista. mine in beeswax were given the jejunal transpla t showed of this induced continuous gastric hypersecretion. Using Heldenhain's nouch does the pedicle small caused alight but inconstant depression of matric acidity but it did not regularly inhibit gustric secretion from the pouch and gustrue juice from such pouch as as irritating as normal mucom

Crosman, Dutton, and Ivy also tested the restric sold secretory response t histamine atim lation in nedicle to fund grafts. They found no significant change

DEFEDERCRE r. Auro ms. \\ Dr. \\ Loup, T \\ and Street, P Proc. Soc Exp Biol 943 5 90.

z. Idem Ann. Surg. 945, 8 499. 3. Iyy A. C., Gromman M. I. and Dotton, D. F. Ser.

3 IVY A. C., GROBERM N. I. RED DOTTOV, D. F. SEP.
getty G45, 7. 085
4. KOLOUCE, FELD, JR., DORBER, ALFORDO, T. S., and
W. AVELSETTEX, O. H. Surpery G45, 7. 657
5. LORD, J. N. JR., ANDRUR, W. D. W. and STEPER, P.
THOE SOC. ED BIOL 943, 5. 00.
6. MANOF F. C., and WILLIAMBOY C. S. Ann. Surg. 923,

\* SAMPREIS D. I. SOCKEMAN M. H. FRIEDRA

H F SALTFETTEN H C and F REMAN A. A. Am. J Digest Dis 94 8 37
8. STEPRO, P ANDROS, W DE W and LORD, J W IR.

Science 042 00 208

2. Varco, R. L. Coop C. F. W. LPOLE, S. H., and
WANGENTERN O. H. Am J. Physiol. 94, 33, 475

### PRIMARY CARCINOMA OF THE FALLOPIAN TUBES

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RIMARY carcinoma of the fallopian tubes is a rare disease. Its infrequent occurrence is especially evident when it is compared with the rather frequent incidence of malignant neoplasia in the uterus and the ovaries which, with the tubes origi nate from the muellerian duct. Moreover the clinical manifestations of tubal carcinoma are so protean that the internist rarely arrives at a correct diagnosis even when the process is far advanced. At the operating table the surgeon often is confused by the appearance of hydrosalping and may fail to realize that a distended condition of the fallopian tubes may obtain on a malignant basis. He conse quently may be led to carry out an inadequate sacrifice of tissues. Even the pathologist has difficulty in differentiating from carcinoma of the tubes such divergent lesions as adenomyosis and tuberculous salpingitis. In considera tion of the aforementioned facts and the added knowledge that primary tubal carcinoma carries an extremely had prognosis attempts made along the line of establishing criteria for early diagnosis of the condition would seem to fulfil a worthy purpose Our contribution consists of a review of the literature and the clinical and pathologic analysis of 16 cases of primary carcinoma of the fallopian tubes seen and studied at the Mayo Clinic in the past 40 Years. HISTORICAL DATA

Orthmann in 1888 described what is now generally accepted as the first authentic case of primary carcinoma of the fallopian tube. Although he collected reviewed and accepted 13 earlier examples from the literature examination of these cases in the light of more re cent knowledge leads to the belief that they were instances of metastatic rather than of primary involvement. Doran(6) in 1888 recorded the second well established example and expressed the opinion that the growth had its origin in a benign tubal polyp Kaltenbach in 1880 reported the third case and described the papillary and alveolar pictures which are now almost standard in descriptions of the microscopic appearance of the lesions. Rou tier in 1803 and Tuffier in 1804 furnished the fourth and fifth cases respectively according to Holland In 1001 Le Count was able to review 21 cases from the literature and to point out the frequent association of hyper plastic salpingitis as a possible etiologic factor In 1011 von Franqué emphasized the frequent occurrence of tuberculous salpingitis as a precursor of tubal carcinoma and this was again stressed by L Esperance in 1917 in a review of 40 cases of primary carcinoma of the fallopian tube accumulated from the literature L Esperance described a case of epidermoid carcinoma of tubal origin a type of lesion first recorded for this location in 1016 by Barrett. The number of authentic examples of primary tubal carcinoma had reached the hundred mark in 1910 when Doran(7) supplemented his original report. Along with Orthmann and Vest this investigator pointed out the difficul ties of diagnosis, the tendency toward early dissemination and the gloomy prognosis Vest stated that surgical operation offered a little less than a 4 per cent chance of cure With stimulated interest in the subject, reports of individual cases of this rare disease found their way into the literature so that Kahn and Norris in 1934 were able to collect published data on 323 cases. This number was increased to 427 when Mullins and Mosteller reviewed the subject in 1942. With the cases published in the past 2 years added to those of the present series the accumulation has now reached 450

MATERIAL AND METHODS

The investigation of the material for the present study began with a search of the files of the Mayo Clinic for cases in which car

From the Mayo Foundation, and the Division of Surgical Path-dery. Mayo The Company of the Mayor Mayor Mayor Mayor Mayor Advisor Mayor May

cinoma involved principally the fallonian tube or tubes. Forty two such cases had been encountered over a 34 year period from 1010 to 1943 inclusive The pathologic specimens. removed surgically or at necroosy were all available and were inspected grossly to exclude those cases in which the tubal involve ment was obviously metastatic in nature Excluded also were those cases in which massive involvement of the pelvic viscera made it unlikely that the matter of primary tubal origin of the malignant growth could be decided with certainty Selected for further investigation were specimens in which the involvement was strictly limited to the tubes and a second doubtful group in which although concomitant involvement of the uterus and ovaries was present, it appeared to be grossly of a metastatic nature. No cases in which the tubal mucosa remained intact were accepted for study. In every instance multiple blocks of tissue were removed from involved and uninvolved portions of the tube and from the associated ovarian and uterine lesions when the latter were present. These blocks were placed in a fresh to per cent solution of formaldehyde (3.7 per cent commercial formalin) sectioned at 7 microns with a freezing microtome and stained routinely with hematoxylin and cosin. In cases in which mucus seemed to be present in sections stained by the aforementioned method sec tions cut from paraffin blocks were stained with mucicarmine. The microscopic finding of psammoma bodies and of papillary mucous carcinoma, when tubal and ovarian lesions coexisted was considered as being fair evidence that the primary lesion was in the Similarly the finding of adenoacan thomatous zones in a lesion involving the uterus and the tube or tubes was conceded as indicating a uterine origin. Discarded along with these samples after careful microscopic study were 2 specimens of tubal tuberculosis with epithelial hyperplasia. A residue of 16 cases of true primary tubal carcinoma re mained to serve as a bass for this report

#### CLINICAL AND PATHOLOGIC DATA

Incidence Sixteen primary carcinomas of the fallopian tube were found in approxi mately 10 000 patients suffering from primary malignant lesions of the female generative tract an incidence of 0 if oper cent. Stuebler and Brandess in a comparable analysis found an incidence of 0 45 per cent. Anspach found only 1 instance of primary tubal carcinoma among 19,439 patients admitted to the gynecologic service at the University Hospital in Philadelphia.

1ge The average age of our 16 patients was 500 years with extremes of 34 and 65 years. Nine of the 16 patients had passed the menopause. In the literature 18 and 80 years represent the extremes of age for patients suffering from the effects of primary carcinoma of the fallopian tube. According to Wechsler 66 per cent of the patients affected are between the ages of 45 and 55 years almost a decade prior to the peak incidence ween in cases of uterine (fundal) carcinomas.

Symptoms The commonest complaint was vacunal discharge. This was present in 10 of the 16 cases and in 7 it was the principal symptom. Duration had varied from a days to I year with an average of about 5 months. In postmenopausal patients the discharge was constant and in vounger women it was described as being intermenstrual. The character of the discharge varied from leucorrhea to frank bleeding. In only 1 instance was it described as malodorous. In 1 case the discharge had continued without interruption following curettage of atrophic endometrium Throughout the literature this phenomenon namely persistence of discharge following curettage has been repentedly emphasized as being characteristic of the vaginal discharge associated with tubal carcinoma as opposed to other lessons causing this symptom (22 30) According to Anspach other characteristics of this symptom include the occurrence of the discharge in sudden gushes accompanied by paroxysms of cramp-like pain a phenomenon to which the term hydrops tubae profluens has been applied

Pain in the lower portion of the abdomen usually on the side of tubal involvement was the second commonest symptom and it was a major complaint in 8 of the 16 cases. In I case constant, dull pain had been present for 5 years it probably was related to the

chronic pelvic inflammatory condition associ ated with the tubal carcinoma. In the other 7 cases the pain was usually of shorter dura tion than the vaginal discharge. The pain was crampy and intermittent in character in 6 of these 7 cases and seemed to be related nathologically to distention of the affected tube produced by the expansion of the malig nant growth. In I case however the pain took the form of an acquired dysmenorrhea and it was accordingly impossible to correlate etiologically with the pathologic lesion in the fallopian tubes. Pain was a prominent symptom in 53 per cent of the cases of tubal car cinoma analyzed by Doran Fullerton felt that it was produced by stretching of the muscular coats of the tubal wall

Three patients complained of lower abdominal swelling which had been present for from 3 weeks to 2 years. In 1 of these cases the swelling appeared to obtain on the basis of the size of the carcinoma per se whereas in the other 2 the presence of associated hematosalpinx augmented the bulk of the tubal neeplasm. In the literature this symptom is listed along with vaginal discharge and pelvic pain as completing a triad frequently based on the presence of primary, tubal carcinoma.

Symptoms of a miscellaneous nature commonly found among women suffering from various gynecologic lesions included back ache a bearing-down feeling constitution dysuria frequency menometrorrhagia and so forth. In our series they did not occur in any combination or in any sequence which could be interpreted as being diagnostic of the underlying tubal disorder.

Physical findings. In 14 of the 16 cases masses were demonstrated on pelvic examination. These were described as varying from 4 to 15 centimeters in average diameter and were generally nontender. The right side was given as the location in 5 instances the left in 1 and in 1 bilateral masses were palpated. An anterior and a posterior relation to the utilities were described in 2 cases each and in the remainder the lesion was either too lill defined for more accurate localization than that denoted by the term pelvic. In about half of the cases the masses seemed movable whereas fixation of

varying degrees characterized the rest of the tumors. One of the patients was suffering from the effects of an abdominal sinus tract which had developed after an operation else where for pelvic inflammatory disease. Car commatous tissue curetted from this sinus tract suggested the diagnosis of primary tubal carcinoma but in none of the other cases was the true nature of the lesion suspected clinic ally as one would expect from lack of spe cificity of symptoms and results of examina In the literature although primary tubal carcinoma is productive of palpable pelvic masses the diagnosis is established preoperatively only through the medium of unusual circumstances such as that just cited Falk in 1808 established it in 1 case by exami nation of material aspirated through the culde sac by means of a needle and syringe Martzloff in 1040 duplicated the feat by find ing atrophic endometrium in a woman who complained of a watery vaginal discharge and who had a right adnexal mass which was demonstrated on pelvic examination

Surgical findings The gross appearance of primary tubal carcinoma as seen at the time of surgical exploration was often deceptive In 6 instances the involved tubes were distended particularly at their fimbriated ex tremities the condition resembled hydrosal pinx pyosalpinx or hematosalpinx. In these 6 cases no adhesions and no carcinomatous implants were present and the true nature of the lesion was not suspected until the tubes were opened in the laboratory. In 4 cases undateral or bilateral tumor masses had produced adhesions to neighboring structures such as the uterus the sigmoid the cecum or loops of small intestine. In this group there was a marked resemblance to chronic tuboovarian inflammatory disease. In the remain ing 6 cases the correct diagnosis was anticipated by the finding of adhesions near the growth plus malignant appearing implants on the surface of the corresponding or the contralateral ovary the posterior surface of the uterus the sigmoid or the cecum. In a cases the corresponding broad ligament was infil trated by carcinomatous tissue. One of the patients had associated ascites which appeared to obtain on a malignant basis. The operative

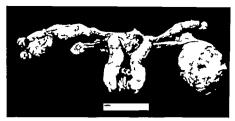


Fig. Encapsulated small carcinoma primary in right tube. The imbrasted extremity of the tube has become occluded and the general similarity to promiping is annurent. The mith ovary us strouble and the left contains a democil cest.



Fig. Poorly encapsulated primary carcinoma of the left fallopian tube. A small overtan implicant is indicated.

procedure in these 16 cases was hysterectomy with bilateral salpingo-cophorectomy because of the laboratory diagnosis of tubal carcinoma from fresh tissue. In 2 cases dissection of pelvic lymph nodes also was performed. In 2 cases an attempt was made to remove local pentoneal implants but in only 10 cases was the surgeon at all satisfied that he had eradicated the gross evidences of malignant disease.

Pathologic data Gross appearance The right fallopian tube was involved in 8 and the left in 7 cases. The incidence of bilateral involvement was 6 per cent about a quarter that reported in the literature. The size of the lessons varied from 20 by 15 by 10 centi

meters to 2 centimeters in average diameter. The size of several of the larger lessons seemed to be augmented by the presence of associated hydrosalpinx or hematosalpinx. As indicated in the foregoing 6 of the lesions were encapsulated whereas the remainder were adherent and frequently demonstrated carcinomatous extension in the form of superficial nodules or distant implants. For the most part the growths seemed to involve the outer or more distensible portions of the tube (Figs. 1 and 2). From 1 of the carcinomas a sinus tract lined by malgiant tissue had extended from the right fallopian tube to the anterior abdominal wall. Hematosalplix was found in 3 hydrowall.

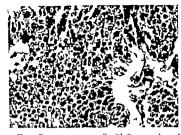


Fig. 3. Primary squamous cell crithelions, grade 3 of the left (fallopian tube. The pathologic mitorsis (upper left) the absence of penrly bodies, and the general variability in the size of the cells and of the nucleus staining are indic stive of rapid growth. Hemstoxylin and cosin stain \$231.

salpinx in 2 and pyosalpinx in 2 of the in volved tubes. In the remainder the tubal distention obtained on the basis of prolifera ting carcinomatous tissue per se Grossly this tissue appeared to be papillary in 8 of the tumors whereas in the remainder no particu lar gross architecture was manifest, the tissue being gravish red soft friable and frequently necrotic. In 6 tumors a superficial attachment to the capsule was noted but in the remainder there was evidence of invasion with peritoneal involvement in 8. Uninvolved portions of the tubes appeared grossly to be thickened and inflamed subacute and chronic salpingitis affected the contralateral fallopian tube in 10 of the cases exclusive of the one in which the malignant lesion was bilateral Watkins and Wilson remarked on the close resemblance between tubal carcinomatous and inflammatory lesions. In both the ostium of the tube tends to become occluded or attached to the homolateral ovary with the formation of a tuboinflammatory mass. In this way spillage of carcinoma cells may be averted until the growths are large (23)

Associated ovarian pathologic lesions consisted of malignant implants in 2 cases der moid cyst in 1 case simple cysts in 2 cases and pencophoritis usually of the homolateral ovary in 6. The uten harbored peritoneal implants in 3 cases and in 5 were the seat of multiple fibromyomas. In this series no



Fig. 4. Primary papallary adenocardnosas, grade 1 of the right fallopian tube. Papillary projections are delicate and covered by one or two layers of hyperchromatic tumor cells which however appear to be fairly well differentiated. The panumona body (dark) is a rather unusual finding Hematoryim and coain stain ×6;

metastasis to the endometrium was encoun tered as reported by Thaler Bower and Clark Ries Mueller and von Franqué.

Microscopic features. The microscopic feat tures found in our cases of primary tubal car cinoma differed in no major respects from those described in standard treatises on the subject (6 7 12 15 16) and will be described only briefly The essential composition was that of epithelial cells which were short, columnar to cuboid and devoid of cilia. Nuclei were large and hyperchromatic with prominent nucleoli and mitotic figures whose frequency in general paralleled the degree of dedifferentiation of the tumor cells. According to the classifi cation and method of grading devised by Broders one of the tumors was epidermoid carcinoma grade 3 (Fig 3) whereas the remaining 16 tumors (1 bilateral) were classified as adenocarcinomas. The degrees of dedifferentiation in this adenocarcinoma group were such that in I tumor it was graded I in 10 graded 2 and in 3 graded 3. The remain ing 2 tumors were of a grade 4 order of malig nancy The lesions of grade 1 and grade 2 malignancy were practically all papillary with single or double layers of fairly well differentiated tumor cells investing the sur faces of delicate connective tissue cores which provided coarse finger like or delicate fila mentous supporting trellises (Γig 4) These lower grade neoplasms did not appear to be as



Fig. 5. Weolar adeocrarchoma, grade 3, of the fallormation and invasion of the mucularist. Moreign body guant cell is present in large on Hematoxyan and cosin × 45.

infiltrating as the others. In the lesions of grade 3 and 4 malignancy the picture cor responded to the alveolar pattern described in the literature (Fig. 5). Here papillary formations were for the most part absent and only poor glandular formation was apparent. Mit totic figures were numerous and frequently atypical forms were seen. Giant tumor cells perivascular growth the occurrence of zones of necrosis and the plugging of lymphatic spaces (2 cases) and blood vessels (1 case) bespoke marked degrees of malignancy (Fig. 6). In 8 of the cases the entire growth appeared to be localized within the contines of the stretched-out tubal peritoneum whereas



Fig. 7 Tubal tuberculosis illustrating the concomitant epithelial hyperplasas high sometimes imagindes the pathologist to making the additional diagnosis of our cinoms. Howatoxylus and coain X A.



tube Celbala typica, noticer byperchromatism, seasy nations figures indicat anapiasla. A poorly formed acina space just above and to right to create is all that indicate gland lar tissue origin. Hematoxyù and cosin. X35 in the remainder there was evidence of exten-

in the remainder there was evidence of extension with frequent involvement of what the surgeon described as surface adhesions.

In common with other investigators we found an almost 100 per cent incidence of subacute or chronic inflammatory changes in the so-called normal portions of tubes that were the seat of carcinoma. However we were unable as a result of our studies to decide whether the carcinoma developed secondarily or whether the inflammatory process represented a reaction to the necrosis resulting from the breakdown of malignant tissue. The former possibility has been proposed and it is supported by (1) the occurrence of carcinoma in the ampullary portion of the tube which is the seat of election for the development of tubal inflammation and (2) the finding of hydrosalpinx pyosalpinx, and hematosalpinx in the contralateral tube as noted in 9 of our CONT.

The concomitant occurrence of tubal tuber culosis and tubal carennoma has been empha sized in the literature (8 10) and an etiologic relation has been postulated. However it is well known that tuberculous salpingits is frequently productive of marked epithelial hyperplana often with the formation of papulary and alveolar configurations. The appearance may suggest carchoma and indeed in 2 of our earlier cases the condition had been so labeled. These 2 cases were eliminated from our series because although the archi-

tecture when seen under low power magnification suggested a malignant process associated with tuberculosis examination under high magnification failed to reveal cellular atypia mitotic figures lymphatic invasion and the other criteria of malignancy which were so prominent in other cases (Fig. 7). In 1 of our cases tuberculous salpingitis involved the contralateral fallogian tube.

None of the tumors seemed to arise in con nection with tubal endometrosis. Tubal adenomyoma was demonstrated in 1 of our specimens but at some distance from the carcinoma Wrork and Broders (5 31) have shown that tubal adenomyomas involve principally the uterine or isthmic portions of the tube and that the lesions are nearly all ways bilateral. The location and distribution of these lesions are accordingly unlike that of primary carcinoma of the tube. No etiologic relation between tubal polyps and tubal carcinoma was evident from the examination of our material.

End results of treatment Two of 16 patients are living 10 and 14 years after operation. In both of these cases the lesions were small and there was no extension beyond the presence of an overien nodule in a case in which the overv was attached to the fimbriated end of the tube Nine of the patients are known to be dead The average postoperative survival in this group was 18 months with extremes of 4 months and 5 years All grades of malignancy were represented in this group with the dura tion of survival being generally longer when the grade of the tumor was low rather than high Postoperative roentgen therapy appeared to delay the fatal outcome in 1 of these 9 patients. Four of the patients have been operated on too recently to permit conclusions as to prognosis but the presence in 2 of peri toneal implants does not suggest a happy prospect The 16th patient has not been heard from It is accordingly apparent in our series that primary tubal carcinoma carries a glooms outlook from the standpoint of suc cessful treatment. A high grade of malig nancy the presence of peritoneal metastasis and the finding of malignant invasion of lymphatic spaces and of blood vessels appeared to be unfavorable features.

#### SUMMARY AND CONCLUSIONS

Primary carcinoma of the fallopian tube is a rare condition which accounts in our experience for only 1 out of every 625 carcinomas of the female genital tract. For the most part it is a disease of the menopause and has not been reported among individuals in their prepuberal years Symptoms are insidious in their onset with vaginal discharge pelvic pain and abdominal tumor representing cardinal symptoms which however rarely lead the physician to a correct preoperative diagnosis. The evolution of the disease is more rapid than is indicated by its symptomatology and the majority of patients so afflicted demon strate lesions of doubtful resectability at the time of surgical exploration. The appearance of the lesion on gross inspection is sometimes deceiving since it may mimic closely familiar tubal conditions of an inflammatory nature Because of this every distended fallopian tube should be opened before it is removed from the operating room. Treatment of these carci nomas whenever found regardless of any apparent state of encapsulation should con sist of total abdominal hysterectomy with bilateral salpingo-cophorectomy in addition to removal of any discernibly involved regional lymphatic nodes and peritoneal implants. Postoperatively roentgen therapy should be administered. In spite of these measures the number of 5 year cures is disappointingly small Pathologists who are unfamiliar with the condition will often have difficulty establishing the primary nature of the lesion and should remember that the fall lopian tubes are frequently involved in metastasis from ovarian and uterine sources. Actual involvement of the tubal mucosa strict confinement to the fallopian tube a marked disproportion between the size of the tubal and extratubal lesions as well as a work ing knowledge of the histologic pictures of primary utenne tubal and ovarian carcinomas will be helpful in deciding the primars source in doubtful cases. The epithelial hyperplasia associated with tuberculous sal pingitis should be kept in mind and the diag nosis of tubal tuberculosis and carcinoma should not be made except when malignant neoplasia is manifestly indicated

#### REFERENCES

- A. EPACH, B. M. Am. J. Obst., 930, 50 571 58 2. B. RETT LADY. Proc. R. Soc. M. (Obst. Cyn. Sec.) 010 0 61-68.
- 3. Burrows, D \ Am J Obst., 927 3 7 0-710. 4. Bower JO and Clark, J H Arch. Surg 19 5,
- Bonris Jo ....
  1 56-507
  REODFAS, C. Minnesota M. 0 5 8 726-73
  The Man T. Path Soc Lond 888, 30 6. DORYX, ALBY
- 7 Idemi J Obst Gyn Brit Empire 0 0, 7 23 R. L.E. PFRANCE ELISE S. Proc. Nork Path. Soc.,
- 19 7 7 148 55. 9 FALK, E Bert klin Wech 1898, 35 554 356 576-
- sto. FR NOCE, OTTO VON Ziech Geburtah, Gym o
- 60 400-451
- FULLERION II D hm J Surg 040 48 467 472
  HOLLAD II II Surg Gyn Obst 030,5 683-60
  3 KARN, M E., nd N REIS, SARTEL hm J Obst.,
- 034, 25 303 402

  14 KALTYNBUCY Zbl Gyn 880, 3 74 75

  3. Lr COCNT E. R. Bull. Johns Hopkins, Hosp., 90
  - 2 3 68

- 16 MARTELOFF K. H. Am J Obst., 1949, 4 Sag-8 7
- 7 MUTLIFE, Cooked by Barrows, D \ (3)
  18. MULIFES D 1 and MOSTFILES, R. Am. J Obst.,
- 043 45 1042 044 to. Owners v. Zechr Geburtsh. Gyn 1888, v. 212-
- 20. Rrss. Chrs. J Am. M Ass. 1807 8 ( ROUTHER Opoted by Holland, W W ( s) 22. SHITH W S. Am. J Obst. 03 24 267 270 3 STOLE MAX. Arch. Gym., 002 66 3654 2.
- 24. STUTBLER, L. and BR ND St. T Ounted by America.
- B M()
- 25 THALFE, H. ZLL CYR., 1920, 44 576-579. 20. THYPPE Ouoted by Holland, W. W. (2) 27 VEST C. W. Bull Johns Hopkins Hosp., 9 4 25
- 305 3 7 25. 11 Think R. E., and Wilson, W. M. Sung Gyn.
  - Obst 930, \$ 5 3 20. Wrossirs, H F Arch, Path, Lab. M 1926, 2 61
- 300 30 WHARTON, L R., and K ock F H Arch Surg 929,
- 0 518-570 Throng, D. H., and Brooms 1 C. 1m J Obst., 94 44 413 432

#### SPONTANEOUS RUPTURE OF THE SPLEEN

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PONTANEOUS rupture of the spleen a serious condition which demands careful clinical evaluation and prompt surgical intervention is relatively uncommon and therefore may be difficult to diagnose. In the hope of stimulating interest in this subject 3 cases are presented to demonstrate this difficulty in diagnosis. Two of the cases are from personal experience and the third is reported from a clinical summary received from another hospital

CASE 1 An enlisted man, 10 years old, was admitted to the hospital on August 17 1043 He had served in the Army 4 months. His home was in Philadelphia, Pennsylvania. He complained of vague basel headaches, abdomi-nal pains, and a cold. The headaches, which started soon after he was inducted into the Army would last from 1 to 12 hours and would then disappear He had rarely ever had a headache before induction. During these attacks his stomach was upset and he could not tolerate food. In addition he complained of shortness of breath. There was nothing significant in his past history. He was slender, 6 feet tall, and weighed 130 pounds. He had mild acne his nose, nasopharynx, and tonsils showed a mildly acute infection. His chest and cardiovascular system were normal, the blood pressure being 110/64. The only positive findings were a generalized lymphadenopathy and an enlarged solcen. No abdominal tenderness was noted Infectious mononucleosis was suspected and ruled out. The Wasser mann test for syphilus was negative. The initial impression, as noted by the ward surgeon, was that the man was suffer

ing from psychoneurous and acute nasopharyngitis. From August 17 mill August 23, 1043, he ran a lowgrade temperature and developed a frank folikular tonsilitis. A course of sulfadiazine treatment, consisting of a total of 3 grams, was given during this period. The lymphadenopathy and enlarged spleen did not change per

ceptibly

At approximately 11 30 o clock on the morning of August 33, while returning from the latrine in the ward, he felt a spiden, severe pain in the upper left abdominal quadrant, became very weak, and barely managed to get on his bed, when he collapsed. He was seen immediately by the ward surgeon, who found him pale, cold, and clamby ha pulse was slow but weak. The blood pressure was psystolic and 40 disastolic. Tenderness was noted in the left limbar region and over the spiem. His condition was that of typical bemorthase and shock.

The intravenous administration of blood plasma was started immediately and the foot of the bed was elevated. He was seen by the chief of the medical service in consultation, and we both felt that he was suffering from an intra-stationalizable mornings most likely coming from the spiker. Five hundred cultic centimeters i citrated blood was given him. During the following 2 or 3 hours his blood pressure rose to 1 o/80, and the signs and symptoms of

acute shock subsided

In the interim definite generalized tenderness developed over the abdomen, and we had the definite impression of shifting duliness in the abdomen on postural changes. The total red blood cells and hemoglobin decreased and the white cell count increased. At first there was a polynu cleosis on differential count, but later we observed a definite

reversal of the leucocyte lymphocyte ratio (Table I)
At 8 30 p.m we decided to operate, but the patient
refused. Operation was therefore delayed until we could
reach his father and mother in Philadelphia and obtain

their consent to operate.

Pentothal sodium was given the patient while he was in bed, and this was supplemented in the operating room by

ether administered by the closed method

Operation was started at 1:01 a.m. and ended at 1:44 a.m. August 24, 1:04.3. An incision approximately 7 incision in more possible long was made over the middle of the upper left rectus muscle, extending from the costompisoid angle to the level of the umbilicus. The abdomen was opened and a large quantity of dark blood was encountered. The spleen was found lying laterally against the abdominal wall. A large rent on its curved surface extended from the upper to the lower pole. It was delivered out of the abdomen and digital control was used on the pedicle until a series of clamps were applied. The pedicle was then divided and the spleen was removed. A mass ligature was placed around the pedicle, and each vessel was ligated separately distal to it. The naw surface was peritonentiated. Several double handitus of clots were removed from the left trough in the region of the kit kindry. The abdomen was then closed without drainage. During the operation 500 cubic centimeters of citrated blood was siven. He returned to his bed in ex-

cellent condition.

Following is the pathological report (Figs. and 2)

The specimen consists of a spleen immersed in normal
schne measuring 16 by 12 by 7 centimeters. On the dia
phragmatic surface is a huge, gaping capsular rupture
running the entire length of the spleen and measuring 8
centimeters across. This rent is covered by large shaggy
clots. Cut section shows incidiatout markings. It is im
possible to identify the follicles. The pulp is bright,
plankish red The capsule is thin the consistency very soft.

Microscopic examination revealed the following The follocies are entirged and not sharply demarked. The pulp is cellular with increase in the monocytic elements. The sinusoids are collapsed and contain little blood. The cansule is thin. A lammated thrombosis covers the torm

eplenic surface

Diagnosis ruptured acutely hyperplastic spleen.

The postoperative course was very stormy and hectus. On the day following operation he was given a third transfusion of 500 cubic centimeters of citrated blood. From this time his red cells and hemoglobin stayed normal of above. Two days following surgery his temperature arose to rot degrees. For two seasily controlled by coverible most him with a wet sheet and allowing an electric fain to blow on him. Y ray pictures at this time showed evidence of portugons in the left base. Treatment with sulfadiasine, is game very a hours, was instituted. His temperature be came normal 5 days after the operation. The sulfadiasine was discontinued the next day. On the following day a typical sulfadiasine rish appeared which desquamated as time went on.

On September 4, 1943, the wound separated down to the deep fascia. A course of treatment consisting of vitamins B and C followed.



Fig. Diaphragmatic surface of spicen.

Throughout September 044 there were episodes of los grade fever anorexia, etc. Repeated examinations for undulant fever malaria nd the typhoid group were. It negative

During October he bega eating better gained eight and strength. If an transferred to the convalencent barracks. If began't complain of his basslar bendaches

and vague abdom nal pains.

Finally, on December 0, 043, he w gi en a certificat

of disability discharge because of psychonourosis, severe CARE 2. On November 3 043 an officer aged 24 years, entered the hospital, complaining of sureness in his upper left abdomes and eakness. Ten days before enter fing the hospital, after doing tumbling act t the gym

TABLE L-LEUCOCYTE 1/1/11/11/10/CYTE REVERSAL
IN CASE I

D <sub>8</sub>	Toss	Rbc	# bu	ille gen	Poh	Lymph
F- F-44		4,900,000	HO.400	_		- 10
S- 3 44		4.799,600	0,200	i -	•7	
<b>6</b> →3-44	Jop m	Trussi ota ,jeo,ooo	ated bload		_	
8-13-44	30 P M	J. 1 0,000	100	1	70	70
8-12-21	# =	Operation i Operation e		cotrated blood		_
8- +4	3 co 10	1,000 000	1,300	re		. 44
8-24-44	(ATTS 900	citrates	d blood			1
B- 9-44		1.900,000 GO 60 900	uli, joo citrist	ed bilosed	69	M
B-04-41		4,500,000 GENTH 500	g, <del>doo</del> Calins	ed blood	٠	
8-48-44		4.990,000	6,,00		70	-

as sum the other officers, he noticed severe pain in the upper left quadrant of the abdonce, hich was followed by distribute. The societies personned to the as constituted of the const

If a observed carefully during the next 36 boars (2) Du g this time in syst of the transfusion, ha red blood cell count gradually fell. If was felt that the axis as he mg also aintra aldomainal homorrhage probably splenic in origi. () The chief of the medical service and ter very truck! terested in the reversal of the lencocy!

hymphocyti ratto t this time (Table II)

Witer due consideration, operation—decided on, and
was performed at 33 pm on November 10, 043 (3)

Incideon as made in the left parametisas in: extending
from the contomphoid angle t the level of the untilities,
thus opening the abdomen. There as skipht evidence of
hemorrhage present. A self-retaining retruction was placed.

In the ound. The anterns surface of the larer and gall builder appeared normal. The abidson and contents ere then gently punked doss mand and t the right, exposing rey large spices surrounded by free blood and blood clots. The done of the spicen as found adherent to the day hangen. These adherens are broken doss by blant finger dissection. They were caused by an engagined between the appear and displace that as beereding of the content of the spicen and the spice that as beereding. After consider from the spice from the wound, blood was seen consider from the spice for in the biblist. There champs were applied to the predick and it as out between the distal t. Double hightures were pixed on each ossel and the ra surface as pertoneclated. All blood clots are removed from the spicele flows. The larer and ser

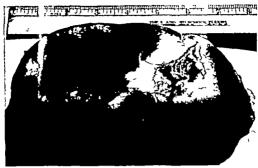


Fig a Hillus of solven.

rounding viscers were carefully examined for bleeding points, but pone was found. The abdowen was closed and the patient was sent back to bed in excellent condition. Five hundred cubic centimeters of citrated blood was given during the operation.

Pathological report. The specimen consisted of a spleen immerted in formalis measuring 18 by 1 by 8 centimeters. On the diaphragmatic surface near the upper pole as 20 by 8 millimeter firmly alterent dark red clot was seen which extended into the splenic substance for a distance of 4 millimeters as a sharply defined red area. On the anterior margin nearer the lower pole two adjacent nodular 15 by 3 millimeter subscappilar bemorthages bulge alignly above the general level. On section they are sharply defined and dark bluish red. The splenic markings on cut section are indistinct and deep red.

Microscopic examination revealed the following: Two large subscipular hemorrhages were present. At another site the capsule was ruptured with a fragment fitted away over the blood clot with bands of fibrin. The follicles were foliation. Both folicles and pulp were cellular. No abnormal cells were found. The sinusods were congested with blood.

Dugnosis ruptured hyperplastic spleen with hemor hage

We are not as sure about the pathological condition here as we were in the first case. There were both new blood and an organized clot about the spleen. The spleen was adherent to the din phragm by an organized clot. The small tear seen in the capsule at operation and the bleeding from the splenic vein could have been more recent and due to handling. In view of the fact that no other hemorrhage was found and the patient is bleeding stopped following removal of the spleen we are at a loss for any other explanation.

There is also a vague history of trauma here whereas the other case was spontaneous on a basis of sensus (6)

The postoperative course was stormy but not as bad as was the previous case. Wangensteen suction was used for 4 days.

On the tenth postoperative day a fraction rule developed at the base of the left lung. This was followed by pleud affusion. Assiration had to be done approximately s<sub>2</sub> days postoperatively. Following this the lungs cleared rather rapidly (Figs. 3 and 4). He was granted a sick leave of so days, a months following the splenetcomy. On his return his chest was negative and his blood picture was normal. He returned to full duty.

In the report of the Ninth Service Command for the week ending November 20 1943 a case of spontaneous rupture of the spleen was recorded We requested information from the hospital in which it occurred and received a complete case report. The following is a brief résumé of the case.

TABLE II --- LEUCOCYTE LYMPHOCYTE REVERSAL IN CASE 2

Dat	Time	Rbc	#/be	Ю⊣се	Poh	Lymph:
2-41	Out patient	4,150,000	6,000	,	60	1
3-44.	Admitted to hospital	3,900,000	4,200			
3 44	Given 500	chtrate	d blood			1
36-11	0 m	3,890,000	,000	_	76	24
#6-44	3 pm	1,700,000	t0,000		75	
10-H	Spm .	\$,500,000	4,000	5	36	61
10-11	Operation 27 G	ST D as	ended clarated	17 m. Dood		
27 44		1,480,000	0,000	1 1	45	55
	1	A. 90 000	6,000		65	14



CASE 3 An officer aged years, was admitted to the hospital November 4 043, t 0 00 pm. If gave history of feeling below par for 3 weeks. The only specific complaint was that of malaise and constitution. He had noticed transient abdominal pain on November 3, 943, but continued t work 11 700 pm on 10 cember 4. 041. tw hours before admission t the hospital, he vomited several times, and had severe abdominal cramps.

On physical examination he was pale, his breathing as rapid, pulse 84, and his blood pressure as systolic on. diastolic 40 His beart tones ere poor He showed mod-erate abdominal distention, peristants could be heard, but no masses ere palpable. There ere no areas of localized

X ray picture of the heat as peratile. His urine as normal and his blood count was red blood cells, 3,650,000, white blood cells, 4.400, polymorphonucleurs &4 per cent, and lymphocytes 6 per cent II continued to grow eaker it oopm on November 5, 943, he as opera ted under spinal anesthesia. A very large, soft, friable spicen themany tears as removed. Two thousand cubic centimeters of blood and lots ere removed. During the operation and manedlately following it, he received one cubic centimeters of plasma and ooo cubic centimeters of citrated blood. At end of operation his blood pressure. as

20/80 and his pulse rat was 20.

The pathological report follow. Specimen consists of spicen which has been sectioned and partly crushed by bel a forced into small bottle so that the external shape cannot be made out. The splenic tissue together eight 470 grams. I some places the capsule is elevated by small blood clots. The splenic tissue is poorly fixed except just beneath the capsule here minut malpighian bodies can be mad out They are idely separated The splenic pulp in the center of the organ is extremely soft, I least partly due to autolysis Microscopic examination reveals marked diffuse cellular overgrowth of the pulp which separates the malpighum bodies and apparently infiltrates them at their periphery in most instances. Throughout the pulp there are seen numerous channels which are uned by endothelium. There is no evidence of incresse tive tissue. I the pulp there are seen few plasma cells and rarely other mature leucocytes. The predominating cell is a fairly large mononucleur cell with deeply stain-



Ifg. 4. Increased thickness in left diaphragmatic area after removal and baorption of picural effusion.

ing nucleus and in most instances a relatively small amount of cytoplesm Some of these cells have larger amon to of cytophase and distinct cell outlines. There re fresorat mitotic figures and many of the immature cells show fairly prominent nucleof. Reticulum stains of the spicen show slight variation in the amount of reticulum i different portions of the spicen however there is no great increase and t is questionable bether there is any increase in reticulum. A relatively small number of the cells, re surrounded by reticulum
Isspectation reticulum cell sarcoma of spicen

By November 7 943, he had developed pneumonus in the left base nd as placed in an oxygen tent II as en en sulfadiazine nd other supporti treatment T elve days after operation after a severe coughing spell, the ound separated. This as closed under pentothal ares-thesis. If never railed and died in spit of all supports. mentures.

At utopsy th following findings ere recorded ( ) pneumonia, loba lower lobe left, upper and lower lobes right ( ) pleurisy acut scrofibrinous theffusion, left severe secondary t lobar pneumonia, (3) embolism, or ganized thrombus, right pulmonary artery severe probably secondary t lobar pneumonia (4) surgical absence of spleen

#### SUMMARY AND CONCLUSIONS

s Spontaneous ruptures (4) occur in the soft overdistended spleen of acute fevers, like malaria typhoid, typhus, acute septic splentis and in fections mononucleosis. A rupture is said to be spontaneous (2) when it happens without apparent trauma or after the insignificant trauma of muscular exertion

2 The 2 original cases of this report showed a reversal in the kucocyte-lymphocyte ratio before surgery which corrected itself soon after surgery

(Tables I and II) In the last edition of Physiclorical Bases of Medical Practice by Best and Taylor the statement is made The spleen serves three well recognized purposes namely (1) the final destruction of blood cells (2) the storage of blood and (3) the manufacture of lymphocytes in the lymphoid tussue composing the malpighian corpuscles. Immediately after operation there is usually a leucocytosis reaching as high as 30,000 At first the polymorphonu clears predominate but as the total count approaches normal there is usually a reversal and the lymphocytes predominate. Klemperer and Hurschield suggested that this action might be accounted for by removal of an organ where pressure, possibly hormonal exercised a depressant action on the bone marrow Bertelli Falta and Sweezer point out that the changes in the peripheral blood may also be brought about by the injection of substances which increase the tone of the autonomic or of the sympathetic nerves. Careful review of available literature did not reveal an instance of this reversal being recorded in a case of a bleeding ruptured spleen before its removal. In both of our cases repeated blood counts were made and the hemorrhage was sufficiently slow to permit this change before surgery

3 Each of the 3 cases mentioned developed pleural and pulmonary complications. It started as pleursy in the left base. In the second case pleurisy with effusion predominated. Since the

curved aide of the spleen is against the diaphragm on the left side the irritation from the hemor rhage and from the trauma of the surgery causes a splinting of the diaphragm which invites stasis and localized atelectasts in the base of the left lung thus bringing about pneumonitis and pleurisy (Figs. 3 and 4)

4. Two of the patients had wound separation. In both of these the chest complications came on early with coughing. In the second case the chest complications manifested themselves after the wound had healed and the coughing did not disrupt the incision

5 Embolism is a very common complication It was probably the immediate cause of death in the third case report

The splenic veins frequently became throm bosed Since the splenic and the superior mesen tenc veins unite to form the portal vein embolism may give rise to septic by lephlebitis of the liver (s)

#### REFERENCES

BLOCKER, T. A. JR. Texas J. M. 1939 34 478-483 BRINER ORDORUE A. Arch. Path., 1943, 36 163 166

COLE, W. H. Surg. Clin. N. America, 1943, 22 43-62

DUBASCH, JAI, and LANGLEY G. F. Brit. M. J. 1944, I 183-184

5 GIUS, JOHN A. McGOVERN JOHN P and McMURRAY
W B Jr. Ann. Surg 1945 121 100-110
6 PUESTOW C. B Surg Clin. N America, 1940, 20

195 205

7 ZABINBEY EDWARD J and HARRIN HENRY N Arch. Surg 1943 46 186-213

## ACCIDENTAL TRANSPLANTATION OF CANCER IN THE OPERATING ROOM

### With a Case Report

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THE literature contains many references to local recurrence about the operative tite, of cancer of the breast and of other organs. Ryall (3) nearly 40 years ago pointed out that recurrence was frequently due to contamination of the instruments used in operation with the cells from the tumor being removed He cited a series of cases in which cancer of the breast tongue, hip larvnx rectum and colon were reimplanted at the operative sites through cancer infection of the wounds by contaminated knives and needles. He mentioned the nost operative occurrence of a distant nodule in the axillary fold following a radical mastectomy when a stab wound for drainage of the operative sate was made with the knife which had been used in the mastectomy and concluded that it was therefore of the utmost importance to guard against the danger of implanting these cells into any fresh wound In 1908(4) he recommended a complete change of gloves, drapes, and in struments, and repreparation of the operative site after biopsy of a malignant tumor has been completed and the exploratory incision closed This recommendation has been made repeatedly since then, having been especially emphasized by Ewing in 1013 and by Saphir in 1016

Saphir presented objective evidence of the presence of vable tumor cells on knives used for biopsies he made smears directly from knife blades and from saline in which such blades had been rinsed. He found large numbers of tumor cells on bla les used to incise tumor masses, and those used to remove the tumors for boopsy pror to radical mastectomy. He demonstrated the viability of the cells by means of supravital stain ing according to the method described by Hick ling. Thus, the presence on instruments of tumor cells, viable and capable of transmitting the cancer infection to other parts of the operative wound, which for many years had been assumed, was clearly demonstrated.

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Tumor growth is occasionally seen at the site of paracentesis or thoracentesis wounds in carcinomatosis of the pentoneum or pleura. We have seen this in 2 instances in the past 2 years.

The operators gives must obviously be another convenient means of transfer of tomo cells, and we wish to report here a case in which it seems evident that contamination of the gloves was responsible for transplantation of a highly malignant carcinoms of the brenst from the must be compared to the seem of the contamination of the seems of the contamination of the brenst from the must be compared to the seem of the contamination of the seems of the contamination of the

#### CASE REPORT

Mrs. M.W. 47 year old office receptionist, entered The Roosevelt Houghtal on May 9, 944, as patient of Dr. W.C. Whit. Ten months previously she had noted small hump in her right breast, which had grow slowly ber doctor had discovered anillary nodes.

Physical examination revealed a centimeter sotender lump in the right breast, situated to clock, bout a centimeters from the spike Its mobility as sightly bmilted, but it was not actually fixed t as temperature of being tached to the underlying fatty tenso but not to the facals. There as fant trace of dimpling of the ikin over the timor on movement. Three hard, nontender freign movable lymph nodes could be felt in the right axilla, and smaller from nodes ere found in the left axilla and the right separchs tacher report.

On the second hospital day radical mestectomy

performed, with bosseduate skin grafting A radial incision as made over the tumor hich to gether th generous amount of surrounding fatty tissue as excised with the high frequency needle. The tumor itself as not incised. Frozen section revealed carcinoma The boopey ound as closed 1th silk not the patient as redraped, the operative area having been pai ted again ith merthiolat. The operator his assessants and the instrument nurses changed t fresh gloves and gos m, and another set of instruments as substit ted for those used in excusing the tumor A circular action as then made th radius of about 16 inches, in about the tumor alt order to void neising or approaching the tumor at outer to room rouning on approximate the temporary of the state of obligately does to sard the abdomen after high the alphe aids, breast tissee thoracle portion of the pectoralis major and the pectoralis major and the aciliary contents from the aper of the arillar, does not are aciliary contents from the aper of the arillar, does not are aciliary contents from the aper of the arillar, does not are removed. The ound edges era satured to th chest wall, lea lag ra area, irregular in outline and centlmeters. \ Padgett ski measuring roughly 7 by

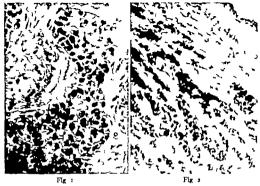


Fig. r. Primary growth in the breast Grade III malignancy. Hematoxylin and cosin.  $\times 188.6$ 

Fig 2 Section of transplanted tumor nodule on left thigh. Skin surface visible at upper left. Hematoxylin and eosin Xoó



Fig 3 Fig 4. Fig 5

Fig. 3. Chupp of tumor cells and lymphocytes found in sedment of weaking fluid from operating room. Hematoxyths and cosin ×3326 6

Fig. 4. Tumor cells in operating room fluid. Case of carcinomia of the breast. Tumor mass was not incised by the operator Distilled water. Hematoxytin and

Tumor mass was not inched by the operator Sistilled water Hematory lin and codn. X322 6
Fig 5 Tumor cells in saline from operating room basins. Same case as in Fig

rig 5 1 timor cells in saline from operating room basins. Same case as in Figure 4 Hemat vyl n and cosin. X322.6

graft oo8 inch in thekness, was then removed with a der materia from a previously prepared donor site on the left theth, and the graft was sutured to the wound edges with interrupted silk, junctured in many places, and dressed with a cellulose sponge for pressure. The donor area wadressed in a similar manner.

Uter the master my and before the skin grafting was done the operat w s and and tants gloves were washed in distilled water but were not changed

l athological examination of the tissue showed a tumor ma measuring 3 by 3 5 centimeters, irregular in outline unencapsulated and extending into the surrounding fatty

tisue. Diagnosis was scirrhous carcinoma of the breast grade III with metastatic fovolvement of axillary lymph nodes (Fig. 1). Neither the tumor mass nor the involved nodes had been directly incised by the operator.

During a rather slow postoperative recovery additional nodes were removed from the posterior triangle of the recover the right sid and on examination these also revealed neets a state carcinoma. I pithelization of the donor side on the thick was slow and the patient a general condition did not warrant discharge from the hospital until the 8th post operative week. Yay examination of the chest made J thefore discharge was negative.

One month later the patient was readmitted in stat of cacheria. X-ray studies at this time above of widespeed metastatic involvement of lumps and bones, and there are local lift recurrences at the mastectomy sit. Her course was rapidly downhill, and she died on the 3rd hospital was

At autopsy the patient was pake, eachertic, weighing bout on pounds. Multiple sidn recurrences are noted along the mastectomy sear at the lines of incision and at the atter of nutres wounds. Multiple metastans were seen throughout the chest cavity particularly on the right, the right pleura, lung, pericardium and mediastinal nodes are involved, and there was nodule on the wall of the right sariels.

right antice

The skin donor sit on the left anterior thigh was studded with firm, discrete irregular nod les, the largest being about 0.5 centimeter in diameter (Fig. ) Microscopic examination of these nodules revealed carripona smiller t

that seen in the primary breast tumor (Fig. )

The possibility of metastatic transfer by way of the blood or lymph stream from the breast to the skin of the thigh is too remote to be considered. and since no instruments were used both at the breast site and at the donor area the gloves of the operator and his assistants must obviously have been the means of transfer of tumor cells. We have previously pointed out that the gloves were washed in the basins of distilled water provided in the operating room for that purpose after the mastectomy and before the removal of the derma tome graft from the thigh. Merely washing the gloves in this manner is obviously an insufficient precaution the tumor cells may not be completely removed from the gloves, and in any event the washing fluid is contaminated with them. The gloves, still wet with this fluid must thus be assumed to be contaminated.

We have centrifused the contents of such basins, the fluid having a volume of 214 to 3 liters. and have found well preserved tumor cells in the sediment. It is not necessary that the tumor be handled deliberately. In 1 instance easily identifable tumor cells were demonstrated in the fluid after a radical dissection of the right inguinal region for removal of tumor bearing inguinal nodes (Fig 3) the primary tumor a poorly differ entiated squamous cell carcinoma, had previously been removed from the dorsum of the foot between the toes. Since the nodes were not incised the contamination must have resulted from the opening of involved lymph channels, which obviously cannot be avoided. The accidental transfer of malignant tumor cells from an opera trve site to a distant part of the body can be avoided by changing gloves and avoiding the use of contaminated washing fluid after the tumor bearing area has been handled

Cells have also been found in a number of cases in the fluid used during operation for carcinoma

of the breast (Figs. 4 and 5) In cases m which the tumor has been handled directly and incised. the cells are more abundant as is to be expected. When distilled water was used it was necessary to centrifuge the fluid and make the smears rather soon after the washing in order to obtain well preserved cells. Cells left in distilled water for more than about 30 minutes before the fluid is centrifuged often become swollen and even disintegrated such cells are probably nonviable. Even with dutilled water, however it should be possible to transfer viable cells when repeated washing of gloves is done at short intervals, when more than one operator uses the same basin, or when gloves are changed and the fluid used to wash the original gloves is again used to remove powder from the new pair before returning to the operation. When normal salme is used cells apparently remain viable for longer periods.

We have had no difficulty in verifying and we peating the work of Saphir. Tumor cells were demonstrated not only on the blades of knives used in resection or biopsy of malignant neo-plasms, but on clamps and tenacula used to grasp breast tumors or to catch bleeding venicle ad-

pacent to them.

A case is reported in which, several months after a radical mastectomy for a highly malignant scirrhous carcinoma of the breast, cancer nodules were found in the skin of the donor site on the opposite thigh The usual precautions had been taken after biopsy of the tumor and before the mastectomy viz., changing of operators and nurses gloves, and redraping and repreparation of the patient. However after the mastectomy when a defect in the skin over the operative site was to be covered a skin graft was taken from the left anterior thigh without first changing the contaminated gloves used at operation. Washing the gloves in sterile distilled water was apparently insufficient and tumor cells were transferred from the operative site to the raw donor area, where they survived and gave rise to tumor nodules.

Previous work in which tumor cells have been demonstrated on knives used for biopses is reviewed and its also shown that the fluid customarily used in the operating room to wash to gloves of the operation is another potential source of contamination of distant parts with malignant tissue.

REFERENCES

Evri J Illinous MJ 933-63 48

HICKLYG, RA J Path Bact, Lond 93 34 7893 RYALI, C Lancet, 907 3
4 Idem. Brit MJ 908, 905,
5 Supril, O Surg Oyn. Obst., 936, 63 775

### INTERCORPORAL BONE GRAFT IN SPINAL FUSION AFTER DISC REMOVAL

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JUSION of the adjacent vertebrae follow ing the removal of degenerated discs is gradually being accepted as the proper procedure In clinics where simple removal of the disc without fusion is performed the results are poorer than in those where the combined procedures are done. Due to this fact many more fusions are now being performed Frequently patients who did not have fusions initially have returned for secondary fusions because of persistent low back pain long after the scratic radiation had been relieved by removal of the degenerated and protruded disc. Other undesirable sequellae following disc removal without fusion have been illustrated in a recent paper by Graf and Hamby

On both a theoretical and practical basis, fusion is indicated. Theoretically, fusion should be performed because the low back pain which antedates the onset of radiating pain to the buttock or leg by months or years in the majority of cases indicates an instability in the lower spine. In addition, there are multiple anomalous developments of facets of the fifth lumbar vertebra, and to a lesser degree the fourth. Their asymmetry and the fact that they are the last and most vul nerable movable segments attached to the pelvis indicate the desirability of fusion. These are the factors which seem to cause the high incidence of degeneration of intervertebral discs at these levels, eventually resulting in protrusion and pressure on nerve roots. We can recall many patients who were completely relieved of their symptoms by simple fusion done after a diag nosis of unstable fifth lumbar vertebra WBS made, with or without sciatic scoliosis. latter we now know as a protective list. A review of the histories and physical findings in many of these patients reveals data identical with that of patients whom we now know to have sciation from disc pressure. It can be assumed, since they were completely and permanently relieved with out removal of the disc, that they could have had incompletely protruded discs or discs which caused nerve root pressure only in certain positions. At operation or in bed following the

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fusion, such discs probably returned to their nor mal positions and after fusion took place between the vertebral laminae were incarcemted in the disc space. Without intervertebral motion, they

could not protrude again

It has been stated in some quarters that a fusion operation in itself is unnecessary, since thorough curettage of the disc space will allow the vertebral bodies to fuse. The proof for such a statement is lacking and vertebral fusion has been rarely demonstrated except in a few cases complicated by infection. The removal of the intervertebral disc and cartilage leaves a space between the vertebral bodies, the ideal situation for nonunion. The writer has had the opportunity to see several patients who came to fusion after discs had been removed elsewhere. In all of these cases motion between the adjacent vertebrae was readily demonstrated by pressure on the spinous processes at the time of operation

This paper is a description of an adjunct to spinal fusion after disc removal 1. A per of hone is driven in between the vertebral bodies into the space from which the degenerated disc and cartilage plates have been removed. It is felt that this peg serves several useful functions (r) It maintains the height of the disc space so that there will be no pinching of the nerve roots in the intervertebral foramina. Indeed in several cases in which the preoperative films revealed narrow disc spaces the postoperative films taken 6 weeks later revealed definite widening of the in volved spaces. (2) The space left by removal of disc and cartilage is partially taken up by the peg so that there is no distraction and the space that would ordinarily be filled with blood clot and eventually fibrous tissue is partially taken up by an osteogenic bone graft. These factors tend to promote bony union between vertebral bodies (3) The placing of the peg into the intervertebral space under forced flexion provides increased stability which allows earlier mobilization of the patient without fear of pseudarthrough

Operative procedure (Fig. 1) With the patient lying prone and the lumbar spine flexed acutely

The idea for the use of the bone peg was the result of dis-cussion with D. Henry Briggs of East Orange, New Jersey. It was under his supervision that the first bone peg was inserted in 1015. It he New Jersey Orthopactic Hospital.

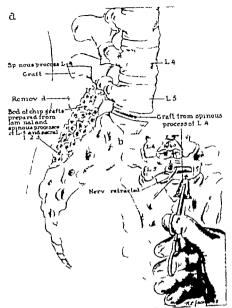


Fig. a, The position of the terrorporal lone graft is aboun, long th the potterior furdon mark. b The manner — high the graft is merted by temoratrated, dia grammatically. (The ners root is not retracted quit as a sporously t operation)

the lumbourral spine is exposed subperosteally through a midline incision from the third or fourth lumbar level to the level of the spinous process of the third sacral segment and laterally to the facets. A self retaining retractor is placed For the exposure of the fifth lumbar disc the spinous processes of the fifth lumbar and the upper sacrum are removed flush with the lamina with an osteorome or heavy rongeur forceps. Ligamentum flavum and enough bone to permit the passage of a finger tip are removed from the

affected side of the interlammar space to reveal the bulging or hernisted das pressing on the first scrul nerve root. If the das appears normal and nerve pressure is demonstrated the fourth lumbar disc is explored in similar fashion and the spinous process of the fourth humbar vertebra removed. When the disc causing nerve root pressure is found, it is removed with a pitultary rongeur either through the hole in the annohus fibrous through which it ruptured in the case of the hernisted disc or through a hole cut in the



Fig 2 The bone graft in position in the fifth lumbar disc space, 6 weeks postoperatively

annulus fibrosus in the cases of the bulging and hidden discs. The disc space is then thoroughly curetted to remove the remaining disc material and cartilage plates of the vertebral bodies. Care is taken to stay within the intervertebral space.

A rectangular peg is fashioned from the spinous process of the vertebra above. This is usually about 2 centimeters long and slightly higher than the estimated disc space. By levering on the adjacent lamina the former disc space is widened enough to allow this peg to be inserted into place. It is then rotated oo degrees by means of a small curet so that the long axis is broadside to the hole in the annulus fibrosus through which it was placed This diminishes the possibility of its being pushed back into the spinal canal. In the more recent cases, up to four pegs have been placed in the same disc space. The exposed nerve root which was retracted medially is allowed to return to its normal position and is covered with a piece of subcutaneous fat Muscle or a thrombin coated absorbable starch sponge is used in troublesome hemorrhage.

A modified Hibbs or chip fusion is now per formed. The facets are thoroughly curetted free



Fig. 3. The bone graft in position in the third lumbar dies space, 3 weeks postoperatively. The posterior fusion mass between the third and fourth lambar vertebrae is well demonstrated. (In this case pantopaque myelography was performed because of bizarre neurological findings indicating that the lesion was not at the fifth or fourth lumbar disc. About two-thirds of the pantopaque was removed.)

of cartilage and bone chips are turned into the apophyseal joints. The laminae of the most superior vertebra to be fused are turned up ceph alad in the form of a buttress. More bone chips are cut from the laminae of the caudal vertebrae with a gouge until no cortical bone is visible on the upper sacral and lumbar laminae to be fused. To these chips are added others cut from the previously removed spinous processes.

After wound closure the patient is placed in a firm bed without other support. He is allowed up in 3 to 6 weeks, usually with a light brace or can vas support. In recent months 2 patients have left the hospital without brace support, because they were unwilling to wear one they have suffered no ill effects and follow up roentgenograms demonstrate satisfactory progression toward fu sion.

Since the procedure described has been in use for only 2 years, no attempt is made to evaluate

## THE INITIAL SURGICAL TREATMENT OF PENETRATING WOUNDS OF THE RECTUM

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HIS communication is based upon a series of 35 consecutive cases of penetrating wounds of the extraperitoneal portion of the rectum operated on at an Evacuation Hospital during the Italian campaign Its purpose is to emphasize certain phases of the diagnosis anatomy and surgical treatment of these wounds and to pose some questions relative to factors governing their management

Musiles entering the body anywhere between the levels of the lower thigh and the costal margin have been known to penetrate the rectum. This is especially true of wounds of the dorsal surface Wounds of the buttocks hip area sacral area and posterior thighs are extremely common in warfare because of the prone position a soldier usually assumes while under fire. While wounds of these regions are most likely to involve the rectum the incidence of rectal penetrations fortunately is relatively very low. In our experience, only 6 per cent of buttock wounds penetrated the rectum Because of its protected anatomical location the rectum will usually escape injury unless the missile has crossed or has lodged near the midline

The patient with a penetration of the extra pentoneal portion of the rectum may present no symptoms referable to this organ at the time of initial examination Consequently unless a thorough appraisal of the case is made prior to surgery the lesion may be overlooked. It is important to study the pathway of the missile by in quiring into the position of the patient at the time of injury and by careful examination hardly seems necessary to emphasize the warning that in studying roentgenograms one must make sure of right and left sides. Yet it is easy to assume that a foreign body lies on the same side as the wound of entrance, unless this point is checked When roentgenological evidence indicates that a pelvic foreign body has traversed the midline, suspicion should be directed immediately toward the possibility of rectal injury. When no foreign body is demonstrable in the films reexamination of the patient is imperative to ascertain the location of the wounds of entrance and exit, and to reconstruct the possible course of the missile In one of our patients a shell fragment had entered the body above the left iluc crest perforated the rectum and emerged on the lateral aspect of the lower third of the right thigh From the appearance of the wounds they seemed to be two completely unrelated penetrating wounds.

What often appears to be an innocuous wound of the buttock or thigh not infrequently is found to penetrate the rectum. The same warning has been made repeatedly in regard to wounds which penetrate the abdominal cavity via the buttocks and has resulted in routine abdominal examinations of patients with buttock wounds. However in the event that the abdominal cavity does not appear to be penetrated the possibility of rectal injury should not be overlooked before relegating the case to a low priority on the operative schedule during a rush period.

It is as important not to overlook concomitant injuries as it is to search for rectal injury. The unmary tract is investigated by physical examination for unmary extravasation by catheterization and by unmalysis. It has been our policy to carry out this procedure in every case of injury about the pelvis. The possibility of peritoneal penetration and major vascular injury is the object of careful routine examination.

On the other hand the presence of other apparently more urgent wounds should not be allowed to divert the attention of the examiner away from the possibility of rectal injury Wounds with dominating symptoms which are most likely to coexist with penetrations of the rectum and thereby lead to incomplete investigation of a rectal injury are (1) penetrations of the peritoneal cavity from wounds in the groins hip area sacral area buttocks or posterior thighs (2) wounds involving the urmary bladder or urethra (1) wounds involving the major vessels of the upper thighs and pelvis (4) wounds involving the sciatic nerve (5) wounds involving the spinal cord (6) wounds resulting in compound fractures of the pelvis sacrum or femur

Gordon Watson relates a bizarre experience with a patient with a bullet wound of the greater trochanter. A wound of the rectum was not suspected 'until the patient passed wind through the greater trochanter with a high musical not.



Fig. Diagrammatic represent tion of sagittal section of pelvis above ng d tribution of endopel ic f scia and identification on the relation control of the pelvis and interest long.

islanes long buch infection ca travel rectal punels In our series there was a patient who was placed in the hands of the prosurgeons when the preoperative medical officer discovered that a wound in the grain had penetrated the nations a unuser. This diagnosis was evident from the presence of gross blood in the urine. The wound of exit was in the perforant lateral and anterior to the anus. After the suprappible cystotoms had been done a rectal examination showed blood on the gloved finger. A re-examination of the patient revealed that fragmentation of the missile or curred after it entered the body that although there was only one wound of entrance, some fracments penetrated the unnary bladder while others found an exit posteriorly. I roctoscopic examination revealed no less than four small perforations of the extraperitoneal portion of the rectum. A

second operation consisting of posterior drainage

and surmoid colostoms was lone. Although the

patient made an uneventful recovery at is obvious

that it would have been preferable to have had

a complete appraisal of the nature of the injury

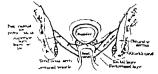
prior to initial surgery so that the complete

operation could have been done at one time and

so that the patient would not have had to undergo

two periods of anesthesia

Another patient was operated on for multiple penetrating and perforating wounds of both thighs, legs and feet with a compound fracture of one foot and a penetrating wound of the but tock. All the wounds were severe. The musule which entered the buttock caused a compound fracture of the llium and though it crossed the midline, apparently passed superficial to the coccyx, missing the rectum The latter conclusion was based on digital examination and following the tract at operation. After a lengthy operation consisting of debredement of all the wounds and immobilization of the limbs in plaster the surgenn was not altogether satisfied that the rectum was intact but postponed proctoscopy until the next day This examination revealed a tear in the



I g Diagrammatic representation of coronal section of pelvis less ed from behind how i g further distribution of endopolise f sea

posterior wall and the patient had to undergo a second operation. Here too it would have been preferable to have done the proctoscopic examination before surgers and to have performed the entire operation at one time. The length of operating time need no necessarily have been grauly increased since a second earn of surgeous could have been employed to work simultaneously on the lumba.

Digital examination of the rectum is very beloful in most cases. But when the perforations are small and the mucosa has contracted partially to seal them, the examining finger often comes away with no blood. Nor can all perforations be palpated. It is also important not to be musled by allowing blood from the penanal skin on the gloved tinger to be interpreted as coming from within the canal Palnation of a foreign body through the rectal wall does not necessarily mean that the mucosa has been breached. Let it is imperative to know whether the mucosa is intact or not since if it is, nothing more than debridement and posterior drainage of the wound need be done while if it is not intact, a more extensive procedure may he necessary such as colostomy

lie necessary such as colosiomy. The most important diagnostic criterion for the determination of the presence of rectal perforation by the presence of rectal perforation is direct vision by proctoscopy. This can often be done on the operating table while the patient is being prepared if it has not aircraft been done in the prooperative department and consumes no additional time. Only by proctoscopy can the nature and extent of the penetrations be ascertained.

The reason for emphasizing a palastaking search for rectal penetrations is based on the fact that if they are discovered and adequately treated one need not fear the development of serious complectations from infection. The pertinent anatom must be understood to appreciate this point (Figs. 1 and 2)

When a breach in the rectal mucosa is repeatedly contaminated from intraluminal contents the spread of infection takes place along fascial planes.

The fascia of the pelvis is reflected over the muscular structures and over the pelvic viscera so that it is commonly resolved into (a) the fascial sheaths of the obturator internus muscle, the pinformis and the pelvic diaphragm (b) the fascia associated with the pelvic viscera known as the endopelvic part of the pelvic fascia or

simply as the endopelvic fascia (2)

The endonelyic fascia is reflected over the various pelvic viscera to form fibrous coverings for them. It is attached to the diaphragmatic part of the pelvic fascia along the tendinous arch and has been subdivided in accordance with the viscera to which it is related. Thus, its anterior part, known as the vesical layer forms the an terior and lateral ligaments of the bladder. Its middle part crosses the floor of the pelvis between the rectum and seminal vesicles as the rectovesical layer Its posterior portion passes around the rectum forming for it a loose sheath which is however firmly attached around the anal canal This sheath is known as the rectal layer of the endopelvic fascia. By common usage the name "fascia propria of the rectum has been applied to this part of the endopelvic fascia. Actually it does not belong to the mural structures of the rectum but, as has been pointed out, is part of the endopelvic fascia covering this organ

The abdominal counterpart of the endopelyic fascia is the endoahdominal fascia (transversalis iascia) which encases the abdominal cavity on all sides. In fact, the endopelvic and endoabdominal fascias fuse at the upper border of the obturator internus muscle and have been described as one and the same layer Analogous to the layer of fat containing blood vessels (properitoneal fat retroperitoneal fat) which hes deep to the endoabdominal fascia, is the pelvic layer of fat contain ing blood vessels, which has deep to the endopelvic fascia. In the pelvis, where pentoneum does not exist this layer of fat hes directly upon the pelvic viscera serving as a protective laver for the blood vessels nourishing these organs The portion of this fatty layer which surrounds the bladder is known as prevesical fat. The portion which surrounds the rectum is less well known but can be clearly demonstrated, especially in well nourished young adults and can be termed prerectal or perirectal fat. The only barner between the perirectal fat and the lumen of the rectum consists of the coats of rectum it self namely the longitudinal and circular mus-



Fig 3 Diagram of coronal section of rectum showing mode of contamination of perirectal space from within and without Width of perirectal space exaggerated

cular coats the areolar coat (teln submucosa) which connects the muscular and mucous layers closely together and the mucous membrane.

With this anatomical picture in mind the path of bacterial invasion from the rectal lumen via a wound in the rectal wall is evident. Bacterial contamination from an active fecal current can pass through the injured rectal wall and attack the susceptible fat (Fig 3) Without an adequate opening in the rectal portion of the endopelvic fascia this layer of fat is placed under pressure and rapidly breaks down. Since most penetrating wounds of the rectum have long tracts from the point of entry on the skin to the lumen the various layers of muscle and fascia of the buttock, thigh or back whichever the case may be slide to form trap doors at each tissue plane. Thus the escape of infected material is blocked even in cases in which the missile tears a gaping hole in the rectal layer of the endopelvic fascia. This situation can result in either a localized pelvic abscess or in pelvic cellulitis. The latter condition is due to the continued breakdown of fat through out the pelvis under the pressure of infection which follows the path of least resistance. Because of the connection between the endopelvic and endoabdominal fascias, it is actually possible for infection to continue upward in the retroperitoneal fat to produce a perinephric abscess.

Infection of the perirectal space can occur even in the absence of penetration of the rectum when this space is not adequately decompressed surgically after a missile enters its confines. It was possible for us to study this type of lesion in a patient who had suffered multiple severe shell fragment wounds which penetrated the thighs, legs, feet back, and buttocks with several compound fractures including that of one femur This patient died 6 days after injury following the development of clostradial myositis (Clostridian myositis (Clostridian codematiens) of the thigh. The missile which penetrated the buttock passed through the

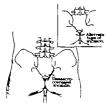


Fig. 4. Sun incision for parametrococcygeal approach to incision of rectal portion of endopeivic fascia. Insert above curvet transverse lineation below tip of coccyx as an alternate type of approach.

gluteal muscles and the sciatic notch penetrating the rectal portion of the endopelvic fascia, but spared the rectal wall. A surmoid colostomy had been done because of contusion of the rectal mucosa, but the foreign body lying next to the rectum could not be removed nor could the pen rectal space be decompressed because of the patient's desperate condition. The patient's post operative condition never warranted a second operation to incise the perirectal fascia. This un fortunate altuation afforded us, nevertheless an opportunity to study the pathological consequences of contamination of the perirectal space from without uncomplicated by fecal contamination from within the rectal lumen as well as to observe the effects of inadequate decompression of the perirectal space. Postmortem examination of the tusue about the pertrectal musile revealed a liquefaction necrosis of the perirectal fat extending for several centumeters around the missile which was a jagged piece of metal with a small piece of cloth The rectal mucosa was intact and the missile plugged the tear in the fascia, thus allowing no escape for the enclosed space infection. Though this lesion was not responsible for the patient's death it could well have led to pelvic cellulitis or abscess formation. The routine administration of penicillin to this patient may have limited the spread of infection but only adequate surgical decompression of the perirectal space and removal of the foreign body could have allowed healing to take place

The initial operative treatment of penetrating wounds of the rectum is designed to prevent this senies of events by employment of the following procedures (a) complete dépridement of the tract (b) adequate incusion of the rectal portion of the endopelvic fascia (so called 'fascia profit of the endopelvic fascia (so called 'fascia pro-

pns.") with nature of the rectal wall when the defect is large (c) construction of a temporary occlusive colositomy designed to divert completely the fecal current and to prevent recontamination of the wound from within. Some details of the technique employed in these procedures will be mentioned.

Removal of the cocyx does not, in usef accomplish drainage of the perirectal gas. Cocyyectomy may or may not be a part of the operation, depending upon the individual cue. Further not only is eccygectomy unseential in most cases but it may actually contribute to certain postoperative complications.

In the early cases of our senes we were performing coccygectomy almost routinely as a preliminary step to incision of the rectal portion of the endopelvic fascia. Surgeons in the base sector hospitals noticed instances of osteomyelitis of the sacrum and pain in the region of the coccyrectomy in a few patients evacuated to them for secondary cure (3) As far as we can determine, neither of these complications occurred in any of our cases. However we agreed that not only could adequate drainage of the proper spaces be obtained without coccygectomy but that a longer incision could be made in the endopelvic fascia if the parasacrococcyreal incision was employed without coccygectomy (Fig. 4) Coccygec tomy was reserved for those cases in which the foreign body actually fractured or partially destroyed the coccyx. When the sacrum was per forated the bony defect was debrided and the parasacrococcygeal incision made without coc cygectomy

In doing the parasacrococyguel drausage, it is important to recognize the various anatonical layers as they are incised. After traversing the skin and subcutaneous fat the following layers can be recognized superficial fascia, futieus maximus muscle near its origin on the later aspects of the sacrum and coccya the thick, white fibers of the fused heavy ligaments (ornating of the superficial posterior sacrococygual ligament, the sucrotuberous ligament and the short posterior sacrollus [igament) loose arrolar tissue the relatively thin rectal portion of the endopoleyic fascia.

With a finger in the rectum, the rectal portion of the endopedvic fasca is incident thus exposing a thin fatty laver (perirectal fat). This fat may be blood stained and not ensily recognizable but with careful dissection is unmatakable. In some instances the rectal finger may stretch the mural structures excessively, giving the surgeon the impression that the fascia must certainly, have been traversed because of the thinness of the tissues drawn over the finger. If the fatty layer is not identified the proper fascia has not been incised or the fatty layer has not been recognized. The meanon in the rectal portion of the endopelvic fascia can be carried the entire length of the skin incision. Since the incision does not involve mural musculature of the rectum or anus, there is no reason to fear incision of the internal subjector.

The incision described is done on the aide of the penetration into the rectum. If there are two per forations at is done on the side having the larger defect. It need not be done on both sides. If the opening into the rectum is large and can be readily found it is closed with either interrupted sutures or a continuous suture of silk, bringing mucosa to mucosa. If the defect cannot readily be seen and proctoscopy has shown it to be small it need not be sutured since the contraction of the mural fibers in bowel at rest will permit the edges to meet and seal.

In the opinion of some surgeons, adequate drainage can be secured through a transverse curved incuson inferior to the tip of the coccyx incision of the rectal portion of the endopelvic fasca and opening of the perirectal space by bhint dissection (Fig. 4) This technique was not employed in any of our cases.

When coccypectomy is indicated it is important to do a complete excision. To leave the proximal segment of the coccyx or a portion thereof usually results in pain on sitting as a late complication. Excusion of the coccyx is done with a scalpel. As a rule no bone cutting instrument need be employed. The coccyx is disarticulated at the sacrococcygeal joint and the remaining cartilage on the articular surface of the sacrum is removed with a curette. If cartilage is allowed to remain it may become necrotic. Extensive partial sacrumectomy is probably an un necessary procedure in most cases. If the wound has perforated the sacrum it is only necessary to remove contaminated and devitalized bone by curettement. If the posterior opening into the rectum is large and lies under the sacrum it can be sutured through the parasacrococcygenl inciwithout destroying a large portion of the secrum for this purpose.

There is no need to discuss in detail the débridement of the soft tessue wound. Suffice it to say that this should be thorough with provision made for adequate drainage by generous incission of facts.

The posterior portion of the operation (débridement and decompression) is best done before the

colostomy is made since it is preferable to complete the operation with the patient lying upon his back. It is well known that turning a patient toward the end of a time-consuming operation has a more profound effect on the patient a blood pressure than if he is turned early in the procedure. Furthermore, by doing the posterior portion of the operation first, it need not be rushed as it might be if done as a last munite procedure with the patient a blood pressure dropping. The only instance in which the abdominal portion of the operation is done first is in the case of active intra abdominal bemorrhage.

The abdominal incision employed in cases requiring colosioning is usually a right paramedian incision. This incision allows somewhat more room for the occlusive dressings which separate the incision from the left illac colosiony than would an incision on the left side of the midline

It is not within the scope of this paper to describe the operative treatment of intra-abdominal penetrations, other than to state that a routine inspection of the intrapentoneal viscera is made and all visceral perforations closed including the perforation in the perticoneum caused by the missile, before the colostomy is made. It might be mentioned that perforations in the anterior intraperitoneal wall of the rectum usually bleed profusely and may be the only source of bleeding in a patient in severe shock due to intrapentoneal hemorrhage.

The usual site for the temporary colostomy in cases of rectal injury is the sigmoid colon. However if any portion of the transverse or descending colon has been perforated by a concomittant migry extenorization of this portion of the bowel can be employed as the site for temporary colostomy. When the right colon or cecum is perforated as well as the rectum, it is advisable to perform a sigmoid colostomy in addition to what ever procedure is carned out on the right colon.

In instances of severe destruction of the rectum which will require extensive reconstruction at some future time, it is best to perform the colorous; in the transverse colon with the two stomatts completely separated by a bridge of skin. The surgeon doing the reconstructive surgery will then be able to mobilitie signoid colon downward, if necessary for the repair of the defect.

Our decision as to which type of sigmoid colostomy to perform—spur or loop—has been governed largely by the expressed preference of the surgeons in the base sector to whom our cases were evacuated. Some preferred to close the colostomies by crushing a long spur others claimed it was easier to suture the loop colostomy and return it to the abdomen. In a recent comperative study it was found that the percentage of successful closures was about the same in both types. The problem thus resolves itself to one of individual preference of the surgeon doing the closure. Regardless of which type is done its main purpose is to divert the feed current. It must place the rectum at rest by preventing any newly formed feess from being packed into the rectum. Stretching of the wall of the rectum can cause contamination of the perirectal tissues by the scepage of material through the wound in the wall.

The technique of colostomy will not be entered into in detail here since the sahent features have been emphasized repeatedly in the hierature. The usual precautions of mobilising sufficient colon to permit a generous portion of exteriorized bowel to protrude without tension, were followed in our series. The left line muscle-splitting incision was placed as far lateralward as possible. When indicated, the lateral pertinent gutter was obsterated by tacking the colon to the pertinent.

Most of our colosiomies were opened immediately after operation and a Paul tube placed into the proximal loop. This was removed after 24 hours. All loop colostomies were treated in this manner. In some instances of spur colostomy the bowel was champed at the time of operation, and the proximal loop opened 24 hours after operation for the insertion of a catheter. In such cases the catheter was removed after an additional 24 hours, and the bowel was divided at the site of the clamp.

In no case was hwage of the distal loop carried out on the premise that whatever fecal material remained in the distal loop soon became deby drated and stationary and might even serve as a "splint around which the rectal wall could be immobilized, thus permitting healing to progress unimpeded. It is our impression that reinfection comes from new moist lecal material and from activity of the rectal wall mather than from in spessated, dehydrated contents.

Some mention should be made of the preperative and postoperative care of these patients. All patients who were suspected of having an injury of the rectum were given the same operative priority as were patients with penetrating wounds of the abdomen they were placed in the shock ward where they could get closer attention than in the preoperative wards during a large influx of patients. Here they were carefully examined and a record was made of temperature, pulse, respiratory rate and blood pressure. Patients with penetrating wounds of the rectum

were typed and their blood cross-matched for blood transfusion. If the patient was in good condition this procedure was nevertheless carried out so that blood would be available and ready at the time of operation. Patients in shock received an emergency transfession of 500 cubic centimeters of low titer type o blood from our blood bank together with 200 cubic centimeters of a 2 per cent solution of sodium bicarbonate intra venously while their blood was being crossmatched for further transfusions. Most patients had received infusions of plasma at the battalion ald station or regimental aid station. Those in good condition were usually somewhat dehy drated on admission to our hospital. Such pa tients received an intravenous infusion of 1000 cubic centimeters of 5 per cent dextrose in nor mal physiological solution of sodrum chloride, or in water slowly Roentgenograms were taken after the systolic blood pressure stabilized over 100 millimeters of mercury A urine specimen was obtained from each patient, by catheterization is necessary and an immediate urinalysis was done. Chemotherapy was instituted on admission of all patients. Early in our series, this consisted of administering 25 grams of sodium sulfadiarine dissolved in the intravenous solution preoperatively Postoperatively 5 grams of sodium sulfa-diazine was given daily in two divided doses 12 hours apart dissolved in the intravenous solutions until the patient could take the drug by mouth He was then given I gram of sulfadiazine with 4 grams of sodium bicarbonate every 4 hours. Dally urinalyses were checked for sulfadiazine crystals, .H. and microscopic hematuria. Records were kept of fluid intake and output. Since May 1944, all patients received intramuscular injections of penicillin, 25,000 units every 3 hours, beginning on admission and continuing until the patients were well along in their postoperative course A Levin tube was inserted into the stornach of patients suspected of having penetrating wounds of the abdomen.

Every patient operated on for a penetrating wound of the rectum received a blood translusion during the operation, in amounts varying from 500 to 2000 cubic centimeters, depending on the requirements. Endotracheal gas-oxygen-ether anenthesia was used in all cases.

The postoperative management depended to a considerable extent upon the nature of the cocommittant injuries. For example, those patients with penetrations of intraperational viscera were treated with Wangensteen suction, intraversor therapy and parenteral vitamins for appendmately 4 days. Those patients whose only visceral wound was one of the rectum were allowed to have fluids by mouth beginning 24 hours after operation Within 72 hours, their diet was usually converted to a dry' diet to prevent 2 loose irritating stool at the colostomy

The patients were kept at our hospital for a postoperative period ranging from 9 to 15 days, and were not evacuated to the base until they

were in good condition

## ANALYSIS OF CASES

The interval between the time of wounding and the time of operation averaged 21 hours in our senes the extremes being 8 hours for the shortest time interval and 55 hours for the longest. Most of the long interval cases resulted from delay in evacuation in the mountainous terrain of the Caseno campaign in the winter of 1943-44. Dur ing this campaign most of the wounded had to undergo a dangerous time-consuming trip being first carned by shuttles of litter bearers down icv treacherous mountain trails often followed by a further trip by mule pack, and finally a long ride in an ambulance which had to pick its way along rough partially destroyed mountain roads. Al though the terrain was even worse in the winter campaign of 1044-45 the casualties reached us in a shorter time because of ingenious improvements m methods of evacuation from the mountains, such as ski-litters and cable baskets. Once the patients reached our evacuation hospital the average time between admission and operation was 41/2 hours for our series of rectal injuries. Generally 2 hours was the minimal time necessary for resuscitation examination roentgenog raphy and preoperative preparation

The location of the wounds of entrance in our cases is worth noting. In 4 cases the wound of entrance was in the thigh. One of these had caused a compound fracture of the femur. In 3 cases the wound was in the hip area and in one case it was above the line crest. These data lend importance to the warning that the rectum may be perforated in instances in which the wound of entrance is remote. In 9 cases the missile caused a compound fracture of the sacrum coccyx or pelvic bones. Six of these entered through the sacrum. Eighteen wounds of the rectum were the result of wounds of the buttocks (Fig. 5)

In 11 Instances, multiple wounds were present. Of these, 7 had penetrated intraperitoneal vascera, while in 2 patients the unnary bladder was per forated. Ten patients had concomitant wounds of extremutes. Of these 2 unvolved major vessels, 1 the scatte nerve, and there were 5 compound fractures of the extremities. Two patients had

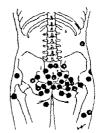


Fig. 5. Diagram showing location of wounds of entry of missiles which penetrated or perforated the rectum in series of 55 consecutive cases. This emphasises the fact that wounds of entry may be remote.

thoraccabdominal wounds. It is these cases of multiple injuries which tax the endurance of the surgeon and which require painstaking clinical evaluation before surgery as well as diligent after-care.

Fostoperative complications occurred in 5 cases. In 2 instances accordary hemorrhage from the middle sacral artery occurred one 6 days after operation and one 8 days after operation. Both of these patients had had coccypectomies. The hemorrhage was arrested in both cases and blood volume was restored. Both had uneventful courses thereafter up to the time of evacuation 15 and 14 days postoperatively respectively.

In the other 3 cases, the complications led to death of the patient, although in only 1 case did the complications result from the rectal wound. These 3 cases constitute the total mortality in our series of rectal wounds, and represent 8.5 per cent of the series. In 1 case abstracted previously in this peper the rectum was contused but not penetrated although the missile entered the peri rectal space. As stated this patient died as a result of clostracial myosith of the thigh muscles following severe penetrating wounds of this part and a compound fracture of the femure.

In the second case death was due to extensive damage to the parenchyms of both lungs and severe shock. The patient suffered multiple wounds of the back, one of which perforated the sacrum and penetrated the rectum. In the right chart there were comminuted fractures of the 7th and 8th ribs with laceration of the pleura, penetration of the night lower lobe with extensive interstitial hemorrhage and hemothorus. The missile which entered the left chest caused commissile which entered the left chest caused commissile which entered the left chest caused com-

minuted fractures of the 10th and 11th ribs, laceration of the pleura, hemopneumothorax, severe interstitial hemorrhage of the left lower lobe, per foration of the disphragm and laceration of the spleen. Besides these wounds, there were multiple penetrating wounds of the legs, arms, neck, and scalp, and a compound comminuted fracture of one foot. The right kidney was contused and there were cortical hemorrhages in both supra renal glands. The patient was admitted 6 hours after injury in profound shock. Desperate ef forts were made to treat the shock, but response was poor Operation was undertaken on the basis of continued intra-abdominal hemorrhage. Through a laparotomy incision a splenectomy was done and a large tear in the left diaphragm was sutured A sigmoid colostomy was brought out through a left iliac muscle-splitting incision. The penetrating wounds of the chest were debrided and the deep layer was closed. Thora centeses were done, and all wounds were débrided. The perirectal space was drained. Although the patient rallied immediately after operation he never did fully recover from the state of shock, and died on the first postoperative day. In this case the rectal injury was of secondary importance and can hardly be implicated as a cause of death

The third case illustrates the spread of infection along the anatomical planes described earlier in this paper. The patient reached our hospital 38 hours after injury during the Cassino campalgn. He was in severe shock, but responded to the usual treatment of massive blood transfusions and supportive measures. He had multiple wounds of the buttock, thigh and leg with evidence of a gas-producing clostridual infection of the thigh wound. There were two perforations of the extraperitoneal portion of the rectum the patient's abdomen was rigid, and there were dimmished peristaltic sounds. At laparotomy no visceral perforations were seen but about 2 ounces of turbid fluid was found in the lower peritoneal cavity A small area of necrosis was noted on the anterolateral portion of the rectum at the peritoneal reflection. Gas was discernible in the retroperitonesi region over the left iliopsons muscle. Definite crepitus was noted with digital pressure on the posterior pentoneum in this region. A sigmoid colostomy was made. Coccy gectomy with drainage of the pertrectal space was done and the wounds of the extremitles were debrided radically There was no major vascular damage in the thigh but the muscle damage was extensive and showed ugns of clostridial myositis. Despite all efforts, including antitoxins, penicillin and blood transferious, the patient developed a severe toxemia and died 4 days after operation

At postmortem the diagnosis of a closindial gas-producing infection of the thigh was confirmed. Regarding the rectal lesion and the gas in the retroperitioneal space, the following except from the autopsy protocol<sup>1</sup> is of interest.

On the anterdation appear of the low ement portion the interpretional return at the pertinent reflection of irregula patchy gray area of necrosis necessities 1 to combinate. This is on the right side. Dissection of the perincutal tissues reveals two fixed passing from the fit obtained on line the substance of the rectul will ber they perforate the mucosa of the rectum 6 centiones apart, the highest at the level of the pertinent relection. These perforations are on the posteriotistic appear of the return on the right. The margins of the mucosal operation are ragged and gray and no foreign body on the location are regard and gray and no foreign body on the location in the perforation of the statement of the control of the perforation of the statement of the control of the perforation of the statement of the control of the perine posteriority, but there is no evident of gas-producing infection here. It is likely in view of the findings in the perineral lissues that the gas encountered in this region was derived from the incentions in the rectum.

In this case the spread of infection under the endopelvic fance had already taken place before the patient came to surgery. Whether the posteror decompression and colostomy ordinarily preventive measures, might have been successful as therapeutle measures in the presence of an already established infection, had the gas infection of the thigh not caused the patients death, remains an unanswered question. This case libertrates the consequences of a long time lag before the surgery in certain instances. However there were several other cases in our series with even longer time lags in which recovery followed initial surgery. This was the only instance in the series in which a surreading pelvic infection was seen.

## FOLLOW UP

Since patients with rectal injuries did not have our hospital until they were in good condition, there was little reason to expect infection to occur at a subsequent date. However questionnairs were sent out to bear sector hospitals asking for follow up information on those patients which the author could not visit at the base. Information was obtained in st of our 35 cases, giving us a representative cross section of the disposition of the cases.

The follow-up covered an average period of 67 days after the patients left our hospital. Contact

Postmorton reasolations were parlicmed by Major Lee Kapine, M.C. A.U.S. was lost once the patients were sent to the zone of interior but all such patients were sent out in enod condition Of 21 patients on whom follow-up was possible there were no deaths. Colostomies were closed in the overseas theater in 13 instances. Of these patients 2 were returned to limited overseas duty while 11 were sent to the zone of interior Some patients who might otherwise have had closure of colostomies over seas, were sent to the States without closure because of the severity of concomitant injuries or for reasons of general expediency. It is difficult, therefore, to estimate what percentage of patients with injuries of the rectum can be expected to return to limited overseas duty. Since there were no complications in any of the cases in which follow up was possible and since those who were sent to the States left the overseas base sector in good condition we can also feel justified in expecting a satisfactory recovery as far as the rectal injury is concerned, in most patients whose colostomies were not closed overseas.

#### DISCUSSION

The notable absence of complications due to infection in the follow up period of our series, and the almost complete absence of pelvic cellu-Ilts (except in one case, in which this was present before surgery) bring up several questions pertinent to the mitial surgical management in cases of rectal wounds. How many of these pa tients would have developed complications if the surgery had been less radical? Was colostomy necessary in every case? What about those cases in which posterior decompression was obviously madequate, and which nevertheless had an un eventful course? What rôle did chemotherapy play in the outcome of these cases? What was the course of those patients in whom a rectal mjury was not discovered?

Certainly the answers to these questions cannot be found in an analysis of our limited series. Perhaps, at some future date, after reports are compiled from theaters of operation throughout the world, it will become possible to state enterna on which to base the selection of cases of rectal injury for radical initial surgery. However some parts of these questions can be clarified from our experience.

We have felt safer in attempting to decompress the perirectal space and in diverting the feeal stream at the initial operation since it was necessary to evacuate the patients to rearward areas after approximately ro days. The patients passed through the hands of several surgeons at various institutions, and it was impossible for the original surgeon to follow each case to its conclusion. It was, therefore in all probability a safer procedure to design the initial surgery to prevent erigencies which might otherwise arise. In civilian practice, many of our patients might have been carried along under close observation until it could be definitely determined whether or not a colostomy should be performed

Those patients in whom posterior decompression was obviously inadequate, but who nevertheless had uneventual courses probably had drain age through the opening caused by the missile. Surgeons at the base sector hospitals have observed an occasional case of peivic abscess developing late but this complication was rare, and as far as we can determine, did not occur in any of our cases

The exact rôle of chemotherapy in cases of rectal injury is unknown. There has been no noticeable difference in the course of our patients treated with sulfonamides and those treated with penicillin, despite the fact that penicillin has no effect on bacteria of the colon group. It is our impression that the initial surgery was the main feature in the treatment, with chemotherapy serving as an adjunctive control of infection.

As to the course of patients in whom treatment was delayed or in which a rectal injury went un discovered we have two opposite types of cases to cite. One had an extremely rapid spread of pelvic infection within 18 hours while the second developed no ill effects whatever up to 8 days following rectal injury The first case already abstracted was one in which the patient developed an extensive pelvic and retroperitoneal infection within 38 hours after injury before surgery was undertaken. As stated this patient died from a toxemia and clostridial infection of a thigh wound so that clear cut evidence of the effects of the pelvic infection could not be appraised. It is known however that this type of case carnes a high mortality rate. In the last war for example pelvic cellulitis from rectal wounds resulted in a fatal issue in 45 per cent of cases (4) For pur poses of illustration this case represents the moid spread of pelvic infection from a rectal wound despite the use of prophylactic penicillin therapy

By contrast, is the case of a patient with a per foration of the rectum who reached our hospital 6 days following injury without surgical treatment. He was a German soldier who was admitted from a German Feld Lazarett during the overwhelming influx of prisoner patients shortly after the mass surrender of the enemy in northern Italy His wound was a transversely perforating guisshot wound entering the left trochauteric area and

emerging in a similar area on the opposite side. The only treatment he had received in the 6 days since wounding was an occasional dose of a Ger man sulfonamide. The patient stated that he had had a few bloody stools for one or two days follow ing injury but bowel movements had been nor mal since then There were no fractures or signs of vascular injury Proctoscopic examination revealed a laceration about 1 centimeter long in the posterior portion of the rectal mucosa 5 centimeters from the anus. The wound contained a bit of clotted blood and the surrounding mucosa appeared normal. There was no evidence of perirectal abacess. The external wounds were clean and dry Temperature pulse, and respirations were normal. In view of the patient a excellent condition and the 6 day interval since wounding it was decided that a conservative policy be followed. Hence no surgery was done by us and the patient was placed on penicillin therapy and watched. He was followed for a period of a days at our hospital during which time he had no elevation in temperature, nor was he particularly uncomfortable. He was evacuated as a litter patient in good condition to a rearward installation.

This case illustrates the fact that there are some cases of rectal injury in which major surgery is not necessary for the recovery of the patient. But what criteria can the surgeon rely upon to determine in which cases of rectal injury major surgery will be required and in which ones it will not? Plainly there are no such critera avail able at the present time. This fact has been largely responsible for our policy of performing a colostomy and decompressing the perirectal space in all cases of wartime injuries of the rectum. The results of this surgical policy have been most encouraging and have brought about a remark able reduction in both mortality and morbidity as compared with previous statistics. Until new criteria can be established for proper selection of cases for nonintervention we believe that we should rely upon these surgical measures as insurance factors in all wartime injuries of the rectum.

#### RUMMARY

Experiences and results in the initial surgical management of 35 consecutive cases of battle injuries of the extraperatoneal portion of the rectum are reviewed. Important aspects of the diagnosis of such cases are presented. Rectal injuries in wartime are usually associated with multiple injuries of other structures, and it is inportant that the rectal injury not be minimized or overshadowed by the presence of other arrest ently more serious, wounds at the time of initial examination. The anatomical relationships of the endopelvic fascia are reviewed to emphasize the purposes and aims which initial surgery must accomplish in order to prevent pelvic infection. The two main features of the initial surgery are decompression of the penirectal space by adequate incision of the rectal portion of the endopelvic fascia (so-called "fascia propria") and (2) colostomy to divert the fecal current until the wound is healed. The survival technique is described. During a follow-up period averaging 67 days in 21 cases, there was a remarkable absence of complications from infection. Certain questions pertaming to the care of rectal injuries remain unanswered, such as the rôle of chemotherapy and the selection of cases for noninter vention. The policy which we have followed and which is, in our opinion the salest under condituons of warfare consists of surgical intervention as described herein, supplemented by chemotherapy in all cases of penetrating wounds of the rectum.

#### REFERENCES

- GORDON-WATRON, CHARLES. Surpery of Modern War fare by Hamilton Balley Vol. 1, ad ed., 426–431. Ballineore William & William Co., qua. p. 426–432.
   GRAY'S ADMINION Edited by Warren H. Levis, p. 446. sath ed. Philadelphia; Les & Feblert, qui.
   HOYT LAWRIENCE E. Med. Bull. Mediterranesa
- Theater Operations, 1945, 3, 14-37

  Military Surgical Manuels, N. tional Research Council
  Abdominal and Genttourinary Injuries. Philadelphia. W B Saunders Co., 1942

# THE USE OF CURARE IN ANESTHESIA FOR THORACIC SURGERY

## Preliminary Report

## PHYLLIS HARROUN M D., and HUBERT R. HATHAWAY M D. Son Francisco, California

OST thoracic surgeons in this area agree that the optimum operating conditions for intruthoracic disease, and also the least physiological upset to the patient, are afforded by the so-called "apietic technique of anesthesia the patients lungs being intermittently inflated by gentle pressure on the breathing bag. However this procedure nocessitates the use of potent anesthetic agents, all of which with the single exception of chloroform, are explosive, thus contraindicating the use of the cautery once the pleura is opened Most anesthetists consider chloroform too toxic a drug to use over the long periods required for intrathoracic surgery.

Although spinal analges a permits the use of the cautery made the chest in cases of thoracic surgery few anesthesiologists have availed them selves of this method as a means of producing agnes. Therefore, in our opinion controlled respiration cannot be used satisfactorily in these

CREES.

When curare was first utilized as a relaxing agent in anesthesia for abdominal surgery it was claimed that its danger lay in its iscuity of producing respiratory depression which might even proceed to apnea if unduly large doses were used. As a result of this statement, we conceived the idea of using this property of curare for the production of apnea during intrathoracc operations. If this proved practical nonexplosive nitrous orde could be utilized as the anesthetic agent and the surgeou could use the cautery inside the chest.

To date this technique has been used on repatients undergoing intrathornoic operations in this hospital. The cautery has been used within the pieurs in every case. It has proved easy to produce apnea and control breathing and no difficulty has been encountered in any case in permading the patient to resume spontaneous respiration. The use of prostignin for this purpose has not been found necessary. The patient's general condition during the operation and post-operative course has been excellent in all cases.

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The only complications which could be even remotely attributed to curare are 3 instances of postoperative atelectasis. These may be attributed to the type of operation and the result of the medication

TECHNIQUE

On the morning of operation, the patient is heavily medicated with a short acting barbiturate morphine and scopolamine, so that he will be brought to the operating room just sufficiently awake to move from bed to table. A nitrous axide and oxygen mixture is administered by means of a face mask. If any difficulty is encountered in producing enesthesia smoothly enough sodium pentothal is injected intravenously to attain satisfactory anesthesia. (Pentothal is rarely necessary) During induction particular notice is taken of the proportion of nitrous oxide and oxygen necessary to keep the patient in first plane anesthesia and well oxygenated. A pharyngeal airway is inserted and the anesthetist a ability to inflate the lungs by pressure on the breathing bag is tested. We consider it unwise to administer curare unless a perfectly free airway allowing in flation of the lungs exists. A quantity of curare' calculated to be sufficient to stop spontaneous respiration is then injected intravenously. No. particular precautions about speed of injection are taken. This tirst administration usually amounts to 150 to 200 milligrams of curare Complete appea or at least profound respiratory depression usually follows in from 30 seconds to 2 minutes. The patient s lungs are then inflated by gentle intermittent pressure on the breathing bag After approximately 5 minutes, when the maximum relaxation has been attained the mask is removed and an orotracheal tube with an inflatable cuff is inserted under direct vision. The profound muscular relaxation usually makes intubation an easy matter. This tube is connected to a conster of soda lime and a breathing bag the delivery tube from the anesthesia apparatus is attached and anesthesia is continued the same concentration of nitrous oxide and oxygen being used which was previously found to keep the Intocostria (Squibb),

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  - Dr Loyal Davis, Ex-Officio

# VENOUS THROMBOSIS AND PULMONARY EMBOLISM

UDDEN death during convalencence has always been a most disturbing epi sode Lay people have learned to dress it and doctors have long been depressed by this insidious and unexpected interference with the recovery of their patient Massive pulmonary embolism from the leg veins is the most common source of this catastrophe In the middle twenties reports from large cinic showed that three persons in each 1000 subjected to surgery would die during conveles cence from this cause. Much was done to prevent these deaths and by careful attention to frequent change in posture and efforts directed to diminish stasis in the leg veins, the ratio of fatalities from embolism was reduced to approximately 1 in 800 All this did not take into account the prolonged convalescence brought about by thrombophlebitis with the post EDITORIALS 233

phiebitic edems and subsequent leg ulcers so frequently seen in those who recovered

Various studies directed toward this problem by many minds finally have brought about certain facts that are important. The development of bland thrombl in the leg veins that come about with no warning has been a new line of thought in recent years. Homans of Boston and Ochsner of New Orleans have contributed much to this subject. The former has preferred the term bland thrombous and the latter that of 'phlebothrombosis These men have emphasized the importance of thrombosis that is noninflammatory and due to the lack of reaction in and about the vem there is far greater chance of such a thrombus leaving the vein and being deposited in the lung If small this detached thrombus produces an infarct or if massive enough it may completely occlude the pulmonary artery producing death within a few minutes. This is a different type of thrombosis than occurs in thrombophlebitis. In this latter disturbance of the venous return there is an inflammatory reaction that produces the painful swollen extremity known as phlegmasia alba dolens That infarct or fatal embolism is less common in this type of thrombosis is an established fact. This is doubtless due to the firm attach. ment of the clot to the wall of the vein present in this type of inflammatory thrombosis. We have found that phlebothrombosis will often and in a higher proportion of cases in certain climates become thrombophlebitis

Efforts to prevent serious sequela from thrombosis of the leg veins have led us to seek methods to prevent the thrombosis in the first place and if thrombosis occurs to prevent death from massive embolism and now to diminish the convalescence of such a victim even though a fatal embolius might be unlikely

Anticoagulant drugs administered first after the thrombosis had become established came into vogue with the discovery and use of heparm This method gave excellent results in many cases but due to the difficulties arising out of its use it is now more generally relied upon as the adjunct to other forms of treatment This drug could hardly be used routinely as a preventative unless the newer inframuscular type of beparin in-oil proves to be innocuous inexpensive and reliable. Dicumarol seems to be satisfactory in the hands of experts as a preventative of serious thrombosis and has the advantage of oral administration and a low cost. However, it carries the absolute necessity for accurate laboratory control of the prothrombin level and if great care is not exerted the complications may outweigh its benefits Serious hemorrhage that has proved fatal in some instances has occurred following its use In all probability further study and research along the lines suggested by the effects of heparin and dicumerol will eventually bring about a safe and satisfactory use of these or similar actine drugs.

Over ten years ago Homans reported four instances of femoral vein interruption in pa tients who were having repeated infarcts from bland thrombosis. Due to the immensity of the problem in the Massachusetts General Hospital there has come about a gradual but steady trend toward femoral vein interruption as an answer to this question. To August 1 rous 861 patients in this institution have been subjected to femoral vein interruption At first attempts were made to determine whether or not a thrombus existed by phle bography-now this method has been alian doned Early we learned that the apparent sick leg might be misleading and that often the most dangerous thrombosis was lying dormant in the opposite, apparently normal side Therefore we have gradually become convinced that bilateral interruption should be done Much time thought, and discussion

have entered into the subject regarding the site of interruption Vena cava ligations have been carried out successfully by Linton in 14 instances. He is disturbed that two of these patients have developed postphiebitic edema with ulcer. Iliac interruptions have been spon sored by Homans who felt that this more serious undertaking was justifiable in order to get above the clot and because the collateral circulation was better at that level than it was after femoral vein interruption. Common femoral vein interruption has been done in a considerable number of our cases but we re alize that the technical hazard is greater and that actually a serious genie edem can follow

this procedure under certain circumstances.

The majority of our patients have been sub-

jected to interruption of the femoral vein

distal to the profunda femoris. This permits

an easy exposure of a segment of vein without

branches to allow opening of the vein and the

removal of thrombi proximally and distally by suction and final complete division of the vein In this series there has been no fatality as a result of the procedure. There have been sur prisingly few instances of infection or lymphorrhea Only one of the patients has developed a postphiebitic ulcer. The average hospital stay after femoral vein interruption has been about six days Patients operated upon before leg swelling develops have no postoperative edema worthy of note. If the operation is undertaken after bland thrombosis has become inflammatory with pain and swelling then a period of postoperative edema occurs. This edema may last several months depend ing on the duration of the thrombophiebitis

imately 6 per cent of the patients having had infarcts before operation will continue to have infarcts afterward. These may be serious enough to warrant the use of anticoagulant drugs. In one instance only was there a fatal embolism arising from the profunds femore after superficial femoral vem interruptionthis in a seventy four year old man with welspread carrinoms arising from the stomach He had evidence of thromboembolic disease on admission with immediate femoral vein interruption. His death occurred 8 days later. This operation is so safe and so simple and if done on the normal vein produces so little swelling of the extremity that prophylactic vem interruptions are being done with greater frequency. Up to the date of this writing this procedure has been carried out in approx imately 100 patients in our clinic. All of this group have been elderly nationts who for reason of their acute disorders, would need a prolonged period of bed rest. Typical of these are the aged with fractures of the hm region-Control experiments are being carried out on a group of patients between the ages of 40 and 65 with dicumarol after operation. The results of this study may show that fewer femoral vein interruptions may be necessary in

before and after vem interruption Amorra

are the aged with fractures of the hip region.

Control experiments are being carried out on a group of patients between the ages of 40 and 65 with dicumarol after operation. The results of this study may show that fewer 64 moral vein interruptions may be necessary in certain types of patients. We feel at this time that older individuals may be more safely managed by prophylactic femoral vein occlusion. Fatal embolism is so much less likely under the age of forty that signs and symptoms can be relied upon to determine the need of thrombectomy and venous interruption in younger patients.

ARTHUR W ALLEN

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## REVIEWS OF NEW BOOKS

DERHAPS the most agnificant book that has emerged from the medical aspects of this war is Grinker and Spregel a Men Under Strass 1 Not only is it an important book, but also an interesting one for it deals with a vital subject associated with war in an interesting personal way. The two an thors have put themselves into this book with enthusiastic competence. This gives to its many rages the elements of unusual industry personal knowledge, experiences gained from combat observation and from close contact with every feature of the aviator's job and the weapons he is trained to use. There is technical information about these things which is unusual in most medical contributions which have come out of this war

The case reports are fine examples of clinical reporting They are generally brief and to the point, centering about and presenting the churcal symptoms while illustrating the algnificant situations producing the psychiatric picture. They contain relevant material for explanation interpretation, and therapy. There are 65 of these case histories, which is perhaps too many and make the authors seemingly overeager to furnish proof of their ideas. The evidence is overweighted by this accumulation of data. This encourages repetition so that the book

spins itself out to too great length.

Through the protocols of the soldiers with their neuroses and the discussions which follow the core of the authors theory of the neuroses which is built around anxiety and the struggles of the ego and

superego is nailed down.

The average reader will be so impressed with the mass of case material and the theories derived from them that he will have little doubt of their absolute validity The critical render on the other hand may be doubtful of the validity of any absolute statements about the human personality especially when these statements concern the dislocation of the personality in the neuroses as substitutions of its pre-existing form.

In attempting to evaluate medical contributions which are written about this war it is well to keep in mind the essential and necessary weakness of all war books written during it. This is especially true of those dealing with the medical aspects of war for the atmosphere of war is not conducive to that critical restraint which is essential during peace time writing on the same subject. A study of the very large number of papers on the war neuroses published during and after the first World War will show the necessity for a critical examination of this book. The conclusions of its authors should not be regarded as final and absolute, despite their evident wish to have them so regarded

There is little evidence of the necessarily tenta tive nature of our present day thinking on the subject covered by this book. A too ready accept ance of the meaning and interpretation of the war neuroses is not an advantage at the present time but, it seems mevitable if this book is taken as the final answer. Neither the sincerity nor the competence of the authors can be questioned. Their therapeutic planning the execution of the plans and their successful management of individual cases are also not questioned. The total conception of the war neuroses, as brought out in this book, however cannot be accepted without a weighing of evidence and the critical analysis of the key implications of the personality structure of the aviator with war neurosis. If the authors, theses are accepted as fact, what is true for him is true for every man whether his neurosis be of war or cavilian origin

The authors approach to the war neuroses is what may be called disguised Freudian. The psy choanalytic formulae are everywhere apparent, but seldom mentioned as such. This fact is disarming The reader will find much to his surprise, that he has been reading about the war neuroses from the point of view of psychoanalysis. The adaptations of the Freudian concepts of personality structure anxiety regression, identification, childhood experiences the pain pleasure principle, infantile traums and so forth, to the neuroses of war are slipped in without any warning to the reader. He will be duarmed further by the omission, in great part of the sexual implications in most of these and other concepts which are so deftly used to build up a body of Freudian doctrine which is nowhere acknowl edged as such. Freud is not mentioned in the body of the book, nor in its preface. It is as though the authors planned it that way so as not to arouse opposition or prejudice against the theories that bear the burden of psychoanalytic thought understandable as this is in the broad scheme un derlying this book, the insinuation of the Freudian view and the use of Freudian hypotheses demand critical scrutiny because apart from the descriptions and clinical reports this book gives a broadly conceived and convenient demonstration of the concepts of the Freudian psychology as the defini tive and final interpretation of the war neuroses.

Prime importance is given to anxiety both as an affective state in itself and as an affective state with

TMER Unions Streets. By Roy R. Geleker, Lt. Col., M.C., and John P. Steepel, Major M.C. Philadelphia. The Riskiston Co., 915

demonstrable objective symptoms as well as various combination of both. From all these conditions mental and emotional turmoil result. The articular, descriptive ability is more evident in those instances in which objective symptomatic displays are less impressive. The authors use case histories to interpret and cluddate first, the eternal struggle between the ego and the superego second the regressive drives as necessary accompaniment of the neurosts and third, the emershing, constantly present anxiety. Anxiety works effectively chiefly through the autonomic system, plus the important rôle played by the endocrine structures as an adjunct source of symptoms.

It may well be that at the present time, there is no more adequate scheme of understanding the neuroses than the one used by the authors lt may well be that they believe their use of Freudian hy potheses as applied to such an array of cases is convincing proof of their validity By continued use and repetition the authors theories assume the aspect of truth rather than remain a series of psy chological hypotheses and speculations. Thus these in the conceptions of the authors become ab-olutes. There is scarcely a page in which the ego and the superego regression and anxiety are not mentioned. These concepts or working hypotheses become in the reader's mind established facts. They stand out, therefore as sharply fixed as those facts which are experimentally derived in physics or chemistry or any science which depends, for valid ity upon controlled experiments. But, despite repetition these concepts remain working by potheses and are by no means facts. That this is not overemphasized may be illustrated by mentioning the many terms used to describe anxiety the ego and the superego. In the title of this book, stress implies an almost physical quality which in the physical sciences can be measured weighed, and mathematically studied By use of such termi nology the authors seem to be striving to give their hypotheses factual qualities. Anxiety is described pressure by such words as free-flowing" 'blocking" "waving, and 'free-floating qualitative and quantitative expressions are in constant use, both in the clinical descriptions and in the pages which follow each case to interpret and explain the theories

It is a more than the control of the criticism of this book is not intended, primarily for the psychiatrically intended primarily for the psychiatrically intended reader. It is written for those who are neurose as a part of a general understanding of the neurotic personality which comes into the general experience of physicians whose interests lie chiefly in the field covered by Surgery Gynecology and Obsticities. It should be made clear to the general reader that the conceptions of the neurotic nechanism, so insistently emphasized are not to be taken as verificable, but rather as a working scheme for which the authors have a strong prediction. The reviewer is referring apenically to the dynamic

picture of the ego and superego mention of which is found on almost every page of this book. A entical examination of these Freudian concepts of the personality and of the theories of the neurous boilt upon these concepts has no place in this revew As working hypotheses they have become the permanent possessions of present day psychatry and their value cannot be overestimated. In this book, however the two systems and structures of the ego and superego act as beings and not as func tions They are endowed with capacities, qualities, and drives which are often specific and exclusive and leave with the reader the picture of a personality made up of two hostile gangs forever at odds with one another forever quarreling for mastery with sly and cunningly devised plots and schemes providing an atmosphere reminiscent of the Kentucky or Tennessee mountain fends In this embattled area, the writers find no place for the creat instinctive contender-the id. Its omission is strange and it is not explained.

In the chapter on psychodynamics, the central item in the causation or in the strategy of the neuroses is anxiety. About the meaning and implication of this affective state there have been enders discussions and polemics. The key to the under standing of the neuroses is the understanding of anxiety This understanding is not facilitated by limiting one's conception of anxiety to apprehension and to loss of some loved one or object nor by at taching its conscious reactions to the ero. Anxiety has to do with the totality of a human being Such a fundamental thing, so tied up with the maintenance of the integrity of a being, cannot and should not be limited to only one part of the personality Nor is it likely that anxiety has its roots in past experience nor does it necessarily depend on them. Annety seems rather, to be the affective response of a person to situations in which disintegration threatens. The integrity of the organism is at stake. Anxiety stimulates fear or even arouses it and thus the at tachment to some specific object or objectives is facilitated. The term free-flowing anxiety and attached anxiety would seem to be a contradiction It is a device used frequently by the authors to add a realistic touch to this and other emotional reactions by endowing them with physical qualities, such as flowing, damming up pressure, and so forth. There is little doubt of the usefulness of such devices, but one can wonder if the gain achieved in clarity is sufficient to neutralize the risk of fixing, in the reader a mind theoretic ideas of the distorted per sonality as established facts.

The resders of this book, and there should be a great many of them, will not all have knowledge of the methods of psychiatric interpretation. Lacking it, they may get impressions perhaps tasting one, of a mechanical human being with devices for it actions in war and pace, for which no experimental proof has been obtained. It is for this reason that the reviewer has thought it necessary to point out some of the imperfections of the authors thinking

on these vital questions. The reader will be so interested and entertained by the case reporting and by the general story that he will fail to see anything out of the way with the planned dynamics of the mea under stress. There is too much good in this book to warrant quibbling over what, to him are unimportant matters.

Psychiatry has suffered in comparison with other branches of medicine from a tendeuty to a too ready acceptance of working hypotheses as facts. What appears to be aspects of the truth in per sonsility structure are, in reality simply outlines or frameworks to strengthen the explanation and interpretations. This lends a degree of amoothness and tangibility which is deceptive. For example, the clear picture from this book, of the ego and the superego in a chronic state of a fittin and a feudin is a doubtfully accurate statement of what happens to a personality whose structure has been

discordantly shocked by war experiences. The average reader, and possibly the more techmeally trained one, will find the chief interest of this book to be in the treatment and handling of the war neurotic aviators rather than in the psychological interpretations of the thing that caused his military disability. He will lose interest in the question of anxiety, regression, the ego and the superego fights but will be concerned with what is being done for them therapeutically. The chapter on treatment and results is much more brief than its importance would seem to indicate This at first sight, seems an error in value judgment. But this is only a super ficial view because in the body of the book which is made up of protocols of individual cases the authors never lose sight of the treatment and the reasons for the many types of therapeutic efforts. One of the outstanding excellencies is the infiltration of the case reports with the treatment problem. Along with this there is discussion of the problems based upon the psychological schemats chosen by the authors. This includes the type of therapy used and the reasons for it in with the basic nevchological schemes of the psychodynamics of the aituation.

The special chapter on treatment is therefore a summing up and the reader is prepared to accept what is written there because he has become pretty well acquainted with it before. This book deals almost exclusively with the aviation wing of the combatant forces and mostly in actual combat environ ment. Some material is from the convalescent bospital in this country where the authors are at present, in active service. The clinical material, therefore, includes the pilot the crew the ground forces and the rest of the personnel who comprise the working organization of a flying unit. This focuses the attention of the study on the activities of the members of the crew in combat photography.

As a result of this conception of clinical reporting the reader in each case report has the conviction

that a therapy is in the process of being developed.

There results a kind of completeness and wholeness

as if the story were told from beginning to end.

reconnaissance flight formation, and so forth. The aviation wing of the forces is a very selective group from the standpoint of physical fitness vouthful ness intelligence and technical training. The screening for aviation is much more meticulous than for the army as a whole. The possibility of physical defects, especially in the special sense organs is reduced to a minimum. The absence of certain phases of the neuroses among flyers as contrasted to the infantry can therefore be well understood Flyers as a rule are better housed fed, rested, and have better recreational facilities. All this adds up to the fact that they should be more amenable to effective treatment, though they more readily succumb to was traumas.

The mobility of the flying forces so important a factor in decreasing the number and serrousness of war neuroses in the ground forces is a constant and not an occasional factor. The stresses are, perhaps more violent, but their duration is more brief Group organization is tighter smaller and much more essential to the smooth working of a crew than it is in other arms of the services. All this means that on this material therepeutic efforts should be more effective than anywhere else in the services, even though there are necessarily few statistical confirmations.

No new types of treatment are described but there are novel and interesting modifications of methods used in the first World War Narcosyn thesis is far better organized and developed than was formerly possible. Hypnosis was used then and is in use now but is less effective, on the whole than pentothal sleep. Shock treatment, the most recent addition to the therapeutic measures in psychiatry has a very limited use in the flying forces. The authors are very right in discarding this method and their reasons for so doing are pertinent. They place their main emphasis on narcosynthesis and the som nalent state produced by intravenous pentothal This represents an advance in procedure of great importance for this drug acts quickly and routinely with few bad aftereffects. Such a drug was not available in World War I and attempts at produring the same effect had to be made with cruder drugs such as earlier forms of the barbiturates bromides and chloral hydrate. Ether and gas were also used for producing this somnalent state.

The use of dream maternal to obtain descriptions of experiences in an emotional state was regarded then, as now, as a valuable source of information about the individual soldier undergoing treatment. Group therapy not then called by such a good term was an automatic necessity owing to the large number of cause and the searcity of trained psychotherapeutists. There is very little mention of these earlier efforts and no mention at all of the man who, without doubt, is responsible for the beginnings of the important place psychiatry has achieved in this war—Dr. Thomas Salmon.

It should be clear in the readers minds how narcosynthesis works and what it attempts to accomplish. It is well to repeat here that the authors regard the use of pentothal, not as a treatment, but as a means of acquiring repressed or forgotten material, which can then be joined to the ego function in an effective synthesis Consciousness then becomes the final arbiter and can choose the proper and healthy utilization of the traumatic experiences as experiences By so enabling the soldier to face himself the original traumatic situation and its emotional consequences, psychotherapy plus narcosynthesis releases the energy by which he becomes an inte-grated personality. This is a sound and intelligent therapy and it does not matter much what descriptive terms are given to the mechanisms which are active in the process of synthetic build-up. This rough and skimpy sketch of the therapeutic pur poses of narcosynthesis does not begin to consider the techniques that are necessary to accomplish this purpose Careful psychiatric knowledge and experience are necessary. In this book, they are described with care and minuteness

The authors give detailed consideration to the limitations of the military psychiatrust and point out, wisely, that his job is primarily a military one and defined by military needs. His main duty and responsibility is to return to active duty as many patients as he can, and to prevent the occurrence of a neurosis in as many combatants as is possible. If the military authorities are convinced of his good faith in these two essentials his advice on the final deposition of cases is generally followed. In this respect, military psychiatry differs from its peace-time brother in the final therapeutic goal. To

change revise and alter a disruptive environment is an important part of civil psychiatric effort, the war the psychiatrist cannot possibly affect the arrangement or qualifiles of combat or precomiat areas. He should try to return his carrel is neurotic to the tranmatic environment that originally produced the neurosis. This war necessity cannot be too greatly stressed and in this book it is amply and emphatically pointed out.

Men Under Stress is a book which will take its place as a permanent contribution to the knowledge already accumulated of the neuroses in this and the first World War In spite of its length and its hurried breathless style in places, there is no question of its value and pertinence especially at the present time. Its appeal rests largely on the very human quality which the authors have put into their writing. It is the story of men under battle and war borne stress It is also the story of a small group of men, themselves in the atmosphere of conflict who give freely and generously of their training, experience knowledge, and good faith, to help the infinitely larger group of men who have succumbed, temporarily or permanently to the forces in the stress and stresses of war. It is finally the story of conflict where the enemy is no longer the armed might of opposing armies but the unarmed might of the neuroses

Eight years ago Freud wrote these words "Wat is the source of the neuroses? What is the ultimate, its specific, underlying principle? After decade of analytic effort, this problem ruses up as untouched as at the beginning. S. J. Sozwas.

## CORRESPONDENCE

SEGMENTAL RESECTION OF LESIONS OC CURRING IN THE LEFT HALF OF THE COLON WITH PRIMARY END-TO-END ASEPTIC ANASTOMOSIS—A Correction

To the December 1945 have of Surgery Gracecology and Obstratus, volume 81, page 503 in the article entitled Segmental Resection of Lesions Occurring in the Left Half of the

Colon with Primary End to-End Aseptic Austromoush Report Based on Fifty Cased by John M. Waugh and Monford D Custer Jr., the author croneously stated that Gibbon and Hodge had reported the mortality after exteriorisation open tions on the colon as 99 per cent. The figure should have been 89 per cent (1 patients, 4 desith) as stated in Table II in the article by Drs. Gibbon and Hodge

February, 1946

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rosing Pancreatitis Causing Complete Stenosis of the Common Bile Duct

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## INTERNATIONAL ABSTRACT OF SURGERY

FOLUME 81

FEBRUARY, 1946

NUMBER 2

# ABSTRACTS OF CURRENT LITERATURE SURGERY OF THE HEAD AND NECK

## HEAD

Campbell E. H., Jr Compound Comminuted Skull Fractures Produced by Missiles. Ann Surg 1945 123 3 5

One hundred cases of compound, comminuted functures of the skull produced by missiles are analyzed. More wounds were caused by shell fragments than by all other means. Inner table fractures were sometimes overlooked and occasionally led to serious complications. Tripod incisions often gave trouble it is recommended that they be avoided when possible. Convulsions were uncommon in the first few weeks their occurrence was sometimes an early manifestation of abscess formation. Subdursh hems toma was present in but a cases. Nineteen patients dereloped superficial wound infections of varying degrees, while 2s developed deep-sated infections. These were manifested by abscess meningitis, cerebral fungus, or some combinations thereof. There were 5 deaths all of which occurred in the latter group.

Intemplete débridement was the largest single factor contributing to wound infection. In those cases in which all bone fragments had been removed infection was uncommon and seldom doep, whereas if débridement had been incomplete or had not been performed at all infection was common and usually deep. Bacteria cultured from these wounds were principally which mubalisants of low virulence.

Treatment consisted in the evacuation of pus and removal of associated bone fringments and/or metal lis foreign bodies, as well as of adjacent necrotic tissee and old blood. Abscess capsules were disturbed as little as possible. Sulfonamide therapy was employed as an adjuvant. Failures resulted only in those 5 cases in which for one reason or another this procedure was not carried out.

Experience, judgment, and skill, as well as proper accurate an amentarium are prerequisites to good primary deburdentent. It is recommended therefore that patients with severe head wounds be creatured as directly as possible to a hospital in which these are available even though a few additional hours be required.

Following the submission of this article in April, 1944 the number of penetrating wounds of the skull treated in the Mediterranean theater of operations increased several fold. Figures based upon 974 cases from the Tunisian Sicilian and Italian campaigns show the incidence of deep infection to have been 12 per cent. During the past vear in particular débridement has been carried out with more thoroughness. Pencillin therapy (25 000 units given intramuscularly every three hours) has been the routine procedure. As a result the rate of deep in fection has been further reduced.

JOHN E. KERRFATRICK, M D

#### EVE

Bland, J. O. W. and Wilson R. P.: Bacteriological and Clinical Observations on the Treatment of the Acute Ophthalmias of Egypt with Sulfon amides and Panicillin. Bril. J. Ophth., 1945 24, 300.

The authors describe their be/cterological and chuncil observations on the treatment of the acute ophthalmais of Egypt with sulfonamides and pen cillin. They point out that the acute ophthalmais of Egypt are caused by bacteria which are sulfonamide sensitive and that treatment with sulfonamides provide the solution (for Egypt and other oriental countries) and only for the treatment of affected patients but also for checking and eradicating yearly epidemics because they reduce the period of discharge from 6 to 1 or 3 days and render cases noninfective 12 hours after administration of the drug.

For every 10 kgm of bodyweight, 0 g gm, of sal fonamide was given in 24 hours as two those a single dose corresponding to the unual 6-hour dose which yields a concentration of from 10 no mgm per 100 c.c. of blood. Because the dosage based on bodyweight is not slowly convenient or practical, and because most cases occur in thidren under xo years of age, a dosage based on age is aggested twice daily M tablet (35 gm tablet) at from 0 to 3 months M tablet at from 3 to 6 months M tablet at from 6 to 12 months M tablet at 17 year M tablet

coccal) of Egypt

at 3 years 1 tablet at 6 years - 2 tablets at 0 years and all tablets at 20 years. The authors conclude as follows regarding the acute epidemic ophthalmias (Loch-Weeks and gono-

1 A single dose of sulfonamide reduces the hac teria in 4 hours and suppresses them in about 12 hours which cures a considerable proportion of

- gonococcal cases by a single dose except the more resistant Koch Weeks cases Two doses of sulfathiasole or sulfadiazine in
- one day at an 8-hour interval will cure practically all cases except Koch Weeks cases
- 3 Two doses on a successive days will cure all cases of gonococcal and Koch Weeks ophthalmia
- 4 A single intramuscular injection of penicillin reduces gonococci to nil in 3 or 4 hours however repeated doses are necessary at short intervals to ensure a cure because relapses may occur in from 10 to 12 hours after a single dose
- 5 As penicillin has no effect on Koch-Weeks cases it is unsuitable for treatment of acute Egyptian ophthalma IORRUA ZOCKYRNAM, M.D.

#### RAD

Machie, W: Effects of Gun Blasts on Hearing. Arch Oteler Chic 045 4 164

The characteristics of the bearing loss following controlled exposure to gun blast are like those of deafness from sustained high noise levels. Acoustic miury and loss are common in gunnery instructors. artiflerists and others potentially serious partial deafness may be expected to occur in significant numbers of military personnel. With repeated equal exposures acoustic damage is cumulative appar ently largely because recovery from the initial tranmatic response is incomplete in the 24 hour intervals

Partial recovery of hearing regularly occurs in the first few days after commation of repeated daily exposures up to six or eight. The rate and the extent of the ultimate recovery from the losses following long periods of exposure need t be further defined. After months of exposure, recovery to pre-exposure levels of acuity is doubtful there was evidence of partial recovery in only a of 10 men studied

Preliminary observations indicate that the obvious relationship between magnitude of exposure, messnred by blast pressures and the resultant hearing loss cannot be narrowly defined because of great variability in the response of individual subjects as well as uncontrollable variables in the behavior of blast waves NOAH D. FARRICART M.D.

Periman H. B.: Reaction of the Human Conduc tion Mechanism to Biest, Laryagescepe, 045

An experimental investigation of the effect of explosions on the human conducting mechanism

was carried out on fresh temporal bones The stimulus used was the shock pulse from a 32-caliber blank cartridge fired from a starting pustol held near the external auditory canal of the free preparation. Protection to the ear is considered and illustrative

records are presented. Jour F Drum, M.D.

Shilling, C. W: Aero-Otitis Media and Loss of Auditory Aculty in Submarine Escape Traising. Arch Oteler Chic. 1945 42 69.

Since 30 per cent of the men undergoing submeriaescape training at the United States Submarine Rese at New London Connecticut have had annul diffculty leading to sero-otitis media and resultant less of auditory acuity the author presents an amhan of the extent of the damage amounted with the training and outlines possible preventive and thenpeutic procedures

He believes certain preliminary observations can be made and some opinions hazarded at this time 1 All cars showing severe damage, grades 3 and

- 4 have thus far been found to have flattening of the eastachlan orifices due to lymphoid hyperplata, and thus roentgen rays and radium should be of great
- 2 Acro-otitis media has been noted to be smodated with a depressed prepressure audiometre curve
- Under conditions of careful selection of the patients and proper administration of pressur, severe otopathological observations with amorated losses of aculty need not be as common as they have been

4 Since this type of trauma leads to acute andtory damage repeated trauma may result in permanent auditory damage. NOAH D. FARRICARY M.D.

Barton, R. T: The Influence of Frequency of Otosclerosis. N England J 11 945, 233 433

The records of 133 otosclerotic women who lad experienced one or more pregnancies were reviewed. Sixty four per cent were stated to have been made worse by at least one of their pregnancies. Over half of these experienced the onset of hearing keep inmediately after parturition (during the lactation period), and ag per cent 6 months or more after ward Seventy per cent noted the hearing loss in the first pregnancy 16 per cent in the second and the others from the second to the seventh pregnancies.

In 50 per cent of the cases the hearing loss was noted only during one pregnancy and unaffected by others

The conclusion is made from the review that many otosclerotic patients are adversely affected by presnancy but there is little uniformity in the time of onset of the impairment and no regularity in the effect of successive pregnancies

No records of the hearing before and after preg-

nancy are presented in the article.

The literature is reviewed on the question of raterruption of pregnancy The author concludes that abortion is never justified because ( ) the effect of pregnancy on otosclerons is unpredictable (s) abor

tion may not arrest the progression of the deafness, and (3) the disease does not endanger the life of the mother John R. Lindsav M.D.

Allman C. H. Panicillia in Otology J 4m M Att 1945 129 109

In a series of 5,600 cases of scarlet fever, o per cent of the petitents developed oftits media. Typings of the organisms cultured from the throats were done on 5 000 of these patients and all aboved Streptocoms hemolyticus type 17. These organisms were resistant to sulfadiazine in in vitro studies. Over 15 per cent of the patients with scarlet fever had received sulfadiazine prophylactically from a few days to two months prior to the development of the disease. About 10 per cent of the patients had received pencillin from the time of onset of the disease and in these the incidence of otitis media was reduced approximately one half

All patients with oftin media received to oco Oxford units of penticilin by intranuscular injection every three hours from the onset of the condition until two days after all signs had subsaded. Local treatment to the ear was limited to dry wiping or insome cases, hot saline irrigations. There were 33 cases (0.50%) requiring mantoidectomy. In these, the operative wound also was urigated with pencillin solution through a soft rubber tube secured in the cavity which otherwise was closed. From 5 to 10 c.c. of a solution containing 500 units per cubic centimeter was instilled every four hours.

All of the patients recovered and there was not a single case of a chronic discharging ear. With the exception of 3 cases in which the lateral sinus was opened, recovery was complete within a period of seven days.

There were 2 cases of meningitis in patients who had not received penicillin. Mastoidectomies were done on both patients. They were given 100 000 units of penicillin intravenously the first twelve bours 15 000 units intrahecally immediately 10 000 units intrahecally menediately 10 000 units intrahecally every 2 hours for 2 days and every 3 hours thereafter until recovery was complete. Four grams of sodium sulfadiazine every 6 hours for a period of 2 days was also given intravenously. Recovery was rapid

Penicillin was used in the same way in 14 cases of nonscarlet fever mastoiditis, with equally good results.

The use of penicillin is given credit for the reduction of morbidity to a minimum in this large groupof cases of othis media and there were no deaths JOHN R. LEDMAY M.D.

Macbeth R. G: A Series of 50 Cases of Acute and Subscute Mastolditis Treated by Glosure of the Wound and Perfusion with Penicillin J Lar Old Load 1945 60 16.

A series of 50 cases of acute or subacute mastoid ris in which penicillin was used postoperatively by perfusi n are presented by the author. Unusual cure was taken to get as complete hemostasis as possible following which a fine rubber tube was in scried at the upper end of the wound and sewn into place. The wound was closed completely. Penicillin solution was then run fato the wound until it cozed out of the incision line. The concentration varied from 250 to 500 units per cubic centimeter.

Dressings were not disturbed for 5 days. During this time at 6-hour intervals, the wound was evacuated and then filled with the penicillin solution.

Of the 50 cases treated 9 were failures from the standpoint of early healing but all eventually healed. The predominant organism was the streptococcus hemolyticus.

No severe complications resulted and the tech nique was carried out easily by the nursing staff loss F Daten, M D

#### MOUTH

Thoma K. H.: Functional Disturbances following Fracture of the Mandibular Condyle and Their Treatment Am J Orthodom 1945 31 575

The causes diagnosis treatment and prevention of complications following the treatment of condviar fractures are described by the author. Five cases presenting major functional disturbances are reported. In order to obtain a clear picture of the condition present recommendations are advanced regarding the use of various positions in x ray examination.

The prevention of complications includes exact reduction by the open method and internal wring plating or skeletal fixation. In fractures with displacement interesseous wining gives excellent results in fracture dislocation skeletal fixation of the condyle to the temporal bone is recommended in addition to the wiring. The two methods may be replaced by the use of the Sherman plate. Two cases of fracture dislocation illustrating the two methods are presented.

NORT D FARMICANT M.D.

## NECK

Harrington S W: Pulsion Diverticulum of the Hypopharynx at the Pharyngocsophageal Junc tion Surgey 1945 18 66

In a series of 140 cases of pharyugoscophageal pulsion diverticulum 100 of the patients were men and 33 were women. Their ages varied from 34 to 80 years, the average age being 57 years. In 80 per cent of the cases the symptoms were vague at onset and slowly progressive. In 30 per cent they were more rapid in progress. The duration of symptoms was from 1 to 25 years the average duration before operation being about 5 years. Filter patients had marked obstruction of the esophagus and 3 had complete obstruction at the time of admission.

The earliest symptom usually is dyaphagis. Later food and mucus are regurgitated. After the sac has become well developed its enlargement is more rapid than before because of the increased pressure from within caused by retention of food and seem

tions Progressive esophageal obstruction often oc curs and the patient's loss of weight may be great. When a large sac that extends into the mediastinum is filled with food it produces marked pressure on the adjacent intrathoracic organs and causes a distressing sensition of fullness in the thorax, which often is associated with dyspanes palpitation of the heart and a sense of suffocation. Severe cough and choking spells frequently occur. Many times patients lower their heads, as is customary in postural drain age, and then press on the side of the neck in order to empty the sac. In some instances food may enter the tracks and cause marked evanosis.

Repeated aspiration of food into the bronchi may result in bronchitis or bronchiestams. In this series of 140 cases, bronchitis was present in 0 cases, and bronchiectasis in 1, Associated bourseness of the voice also occurs. This is caused by pressure or inflammation around the recurrent laryngeal nerve, which is often close to the neck of the sec. In this series of cases, boarseness was present in 8 cases the vocal cord was fixed in 2 cases.

Mer the sac has become definitely formed, the ymptoms are definite and characteristic. The diag nois usually can be made on the basis of the symptoms, but it should be proved by roentgenographic examination. In the earlier stages when the symptoms are vague, a definite cinucal diagnosis may not be possible without an ecophagoscopic or roenigenological examination. These methods are the most accurate in the establishment of a definite diagnosis and the author believes they should be employed in all cases in which there are persistent signs of dysphaga. The longer the diagnosis is delayed the greater is the risk of serious complications which may enhance the difficulties and may impair the results of surgical treatment.

Complete removal of the sac, including its neck is generally accepted as the only effectual surgical procedure for pharyngoesophageal diverticulum. The technical difference in the two operative procedures advocated to accomplish this purpose is in treat ment of the sac and the time of its removal. In the one-stage procedure the sac is removed at the primary operation. In the two-stage procedure a temporary diverticulopexy is performed and the sac is removed at a second operation seven to ten days The fundamental difference in these two procedures is that in the one-stage operation the fascial planes leading to the mediastinum are not walled off prior to removal of the diverticulum and in the two-stage operation the interval between the operations permits the formation f granulations which wall off the fascial planes of the neck and mediastinum. In this series of 140 cases, the onestage operative procedure was performed in 115 cases and the two-stage procedure in 25 cases.

Patients who have lost considerable weight as a result of their inability to obtain sufficient nourisment require properative feeding 1 most instances this can be accomplished by an indwelling stomach tube. Sitteen natients in this series of 140 cases

were prepared for operation by this means. In one case in which complete obstruction was present it was impossible to pass the stomach tube, and a pre-liminary gastrostomy was necessary for feeding.

Dilatation of the introltes of the enoplarus and advisable and has been performed routhely in the last 50 cases of this series. In many instances the introltus is distorted and dilatation minimizes the danger of careting pressure at the site of closur of the plantyax when the patient swallows food post operatively.

In all cases in which there's any evidence of retution in the diverticula, a reentgroupolgical study of the thorax should be performed immediately be fore operation. The reason for this is t be certified to the diverticular, which at operation might be applicated into the limit of the theorem in the cases in which return entities, the diverticulum should be irrigated thotoughly to remove the contents.

The vocal cords should be checked both properatively and postoperatively. In any case in which the patient has symptoms of hourseness it is advisable to check the vocal cords preoperatively

A thread which is passed through the ecophers into the stomach the night before operation is left in place until the patient is taking noundment satisfactorily after operation. This provides a gift over which a stomach tube can be passed if a post operative pharyngeal fatula should develop. Its, however may be unnecessary since only one of the author's patients has required passage of a stomach tube portoperatively because of a pharyngeal fatoit scoppings at at the time of operation, but this practice was discontinued because the tube was often intaining to the sophagus at the sophagus and produced considerable mucas which may be detrimental to healing of the pharyna.

Operation should not be undertaken if the patient has had a recent infection of the threat or length because of the danger associated not only will infection of the threat but also with cough post operatively, both of which would interfere with the healing of the tissues.

The author prefers regional nerve block by the use of proceine. This method permits the patient's reflexes to remain active, which is a helpful safeguard in many instances. If an accumulation of secretions is present in the sac at operation, these secretions can be carefully emptied into the pharynx; they may be either aspirated by suction or swallowed. The act of swallowing is often helpful in identifying small diverticula, as air is forced into the sac. The surgeon also finds it helpful if the patient can talk during dissection around the neck of the sac posteriorly because of the close proximity of the recurrent laryngeal nerve. This is true particularly in those cases in which, because of considerable inflammatory reaction around the neck of the sac and in the sar rounding tissues, visualization f the nerve is di ficult.

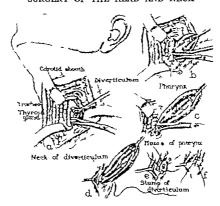


Fig. 1 One-stage directiculectiony a, Incision along anterior border of stermoicledomastical muscles retracting the thyroid medially and the carotid sheath with the stermoicledomastical muscle laterally. The peritracheal fasted is incised at the level of the circoid cartifage, to expose the diverticulum. b, Dissecting the diverticulum from the perturbable fascia and elevating it from the fascial planes, starting at the neck of the sac. c, Dissecting the true neck of the sac from the surrounding numbers of the posterior wall of the pharyms. d, Transfering and lighting the neck of the sac with chronic catigut. e, Invagination of stump of six into wall of pharyms. f, Chosing the chromic categor is, Chosing the chromic categor in the muscles of the posterior wall of the pharyms with chromic categor.

The method of approach to the diverticulum depends on its location but it should be from the side of the neck on which the diverticulum is situated if the diverticulum originates in the midline, the author prefers a left cervical incision. Diverticula usually occur on the left side but in many instances occur on the right telle. In this series of 140 cases the approach was through the left cervical region in 146 cases and through the right cervical region in 146 cases and through the right cervical spring in 146 cases and through the right cervical spring the diverticulum subsequently recurred on the right side and the approach was through a right cervical incision.

The side of the neck from which to approach a diverticulum is determined by a careful study of the anteroposterior roentgenogram. In some instances in which determination of the exact position of the neck of the sac is difficult, esophagoscopic examination is of value.

In the one-stage procedure the incision is made through the skin and platysma myoides muscle and along the anterior border of the stemocletidomastoid muscle from the hyoid bone above to a point about 2 cm above the clavide. The external jugular vein is often in the line of incision in these instances the vein is cut and ligated. The sternocleidomastoid muscle then is separated from the omobyoid and sternothyroid muscles. The latter are retracted medually. This exposes the carotid sheath which with the sternomastold muscle, is retracted out ward. The thyroid gland is exposed and retracted upward and medially this exposes the peritracheal fascia which surrounds the traches and esophagus. If appreciable hypertrophy of the thyroid gland is present, partial lobectomy may be necessary in order to obtain adequate exposure of the fascial coverings of the diverticulum. In many instances particularly if the diverticulum is approached from the right side the inferior thyroid artery and vein course over the diverticulum and in these cases the vessels should be cut and ligated. The fascia then is incised posterior to the traches at about the level of the cricoid cartilage. The neck of the diverticulum usually is located readily at a point opposite the level of the cricoid cartilage.

Several methods such as the use of bougies and the esophagoscope, have been suggested for locating the diverticulum but the author has not found these methods necessary. There is never any difficulty in locating the larger types of diverticula as they lie lateral or posterior to the ecoplaspys. The small diverticula, which often are bursed in the cervical fascia, can be located readily by the simple procedure of having the patient swallow or air may be forced into the diverticulum. The location of diverticula that occur through the posterolateral wall of the pharynx is greatly facilitated by approaching them from the side of the neck from which they originate if a diverticulum originates from the right posterolateral wall of the pharynx and is approached from the left side, there may be considerable difficulty in locating it as well as in visualizing the neck of the sace.

After the diverticulum has been located the fascial coverings are carefully disacted away until the true wall of the sac is reached. The fundus of the sac is elevated into the wound and disaction of the neck if the sac is carried out as it appears through the muscular wall of the pharynx. Great care should be exercised in this disaction to avoid perforation of the sac or injury of the surrounding structures, particularly the recurrent laryngeal nerve. This nerve is often in close proximity to the neck of the sac, particularly in those cases in which the sacculation passes through or beneath the cricopharyngeus muscles. It is important not to separate the fascial planes more than necessary to remove the body of the sac, particularly when the diverticulum extends.

into the mediastinum.

After the sachas been completely dissected free from the surrounding structures the true neck of the sac is dissected from the pharyngeal muscles. Particular care is taken to separate and remove any fibers of the inferior constrictor muscle and of the cricopharyngeus muscle above and beneath the neck of the sac, respectively. In many of the larger diverticula, the opening into the pharynx is large and consists essentially of diffuse bulging of the back wall of the pharynx. In this type, great care should be exerted to determine the true relationship of the opening of the sac to the muscular wall of the pharvax which often is much thinged out. It is important to dissect these diffuse acculations from the muscle and to establish as small a neck to the sac as possible, with care not to remove too much of the mucous membrane because of the danger of producing a stricture. After the true neck of the sacculation has been isolated from the surrounding muscles, it is transfixed by the use of chromic catgut and the diverticulum is completely excised. The stump of the sac is then invaginated into the wall of the pharyny and the muscles of the wall which surrounded the neck of the sac are closed with interrupted catgut sutures. The silk thread which is through the esophagus is pulled taut by the anesthe tist before the neck of the sac is ligated so that there is no danger of including it in the closure of the neck of the sac. A soft rubber tissue drain is placed in the pocket formerly occupied by the diverticulum but it is not placed at the site of closure of the pharyngeal wall. The wound is closed by the use of nterrupted sutures.

In the 115 cases in which the one-stage operator was performed, there were no operative deaths. A temporary pharyngeal fixtula developed in 5 cases. In 3 cases bourseers occurred in 2 to 3 days after operation and subsided within 1 week or 10 days. In one case in which the patient had hourseness of the voice before operation paralysis of the cord occurred and the hourseness continued. The average duration of convalencence in the hospital was less than 1 weeks and the average period of time to dismissal was 33 weeks.

In 5 cases angulation of the esophagus required dilatation. The diverticula recurred in 2 case is one of these the symptoms improved after dilatation but operation subsequently may be required. In the

other case, a second operation was necessary. The author believes there is little risk of mediatinitis after a one-stage operative procedure because in none of his cases has a firstial developed before ya bours after operation. By that time the mediastinal flasmal planes are walled off. However it is important not to separate any more of the tissues of the mediastinal fascial planes than is essential, and to remove the diverticulum starting at the neck of the sac.

Fifteen of the 115 patients in this series had large diverticula that filled the entire mediasthum. In several matances they extended into the boards cavity. The largest one held \$35 c.c. of fluid. There was no suggestion of mediasthal infection after operation in any of these cases.

The results of operation in the 25 cases in which a two-stage operation was performed were as follows. There was 1 operative death in the case of a patient who had Partineons discase. Although this death was attributed to the operation, it was the result of his poor general condition the latter was caused by weight loss as a result of his insultity to take nourishment because of the diverticulant as well as advanced Parkinson a disease. A temporary fartis developed in 6 cases, In 3 cases there was temporary for the cases and in 1 case there was paralysis of or vocal ord. The average convalences before dismissal from the hospital was more than 3 weeks.

Five patients had angulations that required subsequent dilatations. There were 3 recurrences, all of which were treated by dilatation. Two patients subsequently may require surgery

Neel, H. B., and Pemberton, J. D.: Lateral Certical (Branchial) Cysts and Fistules. Surgery 945 8 a67

Congenital cysts and fistulas which appear on the lateral aspects of the neck are referred to as branchial, vestigial, and lateral cervical. There is no unanimity of opinion as to the etiology of these lessons. The work and theory of Wenglowski, however have greatly influenced thought on this subject.

Several members of the same family and of our or more generations may be afflicted Other congenifal lesions also are encountered occasionally in patients with lateral cervical costs and fistules

involved the accessory sinuses the roentgenographic examination frequently showed much more extensive involvement than was suspected from the clinical findings. In several instances a tumor that appeared clinically to involve only the maxillary sinus and nasal fossa was found by roentgenographic examination to be present in the ethmoid cells and frontal sinus as well. In this group, too malignant destruction of the floor and walls of the maxillary sinus ethmoid cells orbit nose, and zygoma was evident at times. In one case in which a nonulcer ated tumor protruded from the vault of the nasopharynx, roentgenograms showed extensive destruction of the sells turcies and cloudiness of the sohe noid sinus which revealed that either of these regions was the site of origin of the neoplasm. Roentgenograms of the thorax were normal in all of the patients at the original examination at the

Only in one of the rr cases was metastatic involvement of bone demonstrable roentgenographically at the time of the primary examination at the clinic. This was a case of a huge, rapidly recurring tomoral the upper jaw maxillary sinus ethmoid cells, and nasal fossa. Roentgenographic examination of the maxillary sinus disclosed not only extensive destruc tion of the upper law maxillary sinus, and ethnoid cells but what appeared to be multiple area of metastatic destruction throughout the skull as well. The patient had no symptoms referable to the servedary tumors. The metastatic involvement might well have furnished a clue to the nature of the leson had the patient been observed prior to partial removal of the neoplasm of the superior maxilla and cheek. The trauma attendant on this therapy had produced extensive sloughing and inflammatory reaction so that the condition strongly suggested a fulminating type of squamous-cell carcinoms. Although the tumor of the upper faw and maxillary sinus had been noticed by the patient for only three months it was assumed that the mallgrant process was primary in this situation and that the smaller deposits observed throughout the calvarium were secondary

## SURGERY OF THE NERVOUS SYSTEM

## PERIPHERAL NERVES

White, J. C.: Pain following Injuries of the Perripheral Nerves. U.S. New M. Bull., 1945, 45, 545

The problems outlined in this article have oc curred innumerable times during the present conflict, and neurosurgeons and neurologists have had ample opportunity to study and evaluate them yet there is still no complete unity of opinion with regard to the underlying mechanisms Painful stumuli may be due to faulty regeneration sepsis and scar thrue formation, although snown plays an impor-tant role. Anoxia may be due to local scarring or widespread vasoconstriction Vasoconstriction is particularly liable to play a part in emotionally Direct cross unstable persons with vasospasm stimulation of sensory nerve fibers by efferent sympathetic impulses is a theory which deserves careful consideration. There are two types of in tractable pain commonly associated with peripheral nerve injuries the phantom limb pain and the causalgic pain. The phantom limb pain often shows psychic manifestations in that it may come and go with the patient's irustrations and achievements.

The treatment of pain in peripheral perve injuries a satisfactory and more or less straightforward, and it is clearly shown that certain outmoded methods are to be avoided. These methods include reamputation, chemical blocking of nerve trunks at gradually ascending levels repeated resection of neuromas perarterial sympathectomy subarachnoid injection of alcohol, and posterior root section. There are two procedures which have proved to be of value the first for painful neuroma, and the second for causaling states. A painful neuroma may be resected once if the pain is localized and if the pain is relieved by procuine block. At operation there are three ways of dealing with the neuroma (1) the injection of 20 per cent formalin into the stump (2) pulling the nerve through a drill hole in a neighboring bone and (3) wrapping the nerve in a cuff of tantalum foll.

In the causaine states the diagnostic test is paravertebral procume block, and in the event that the pain is relieved during the period of the block, good results may be expected from appropriate sympathectomy Sympathectomy however is more effective when pain is principally in the peripheral part of the limb.

There are cases of phantom limb in which the relatively harmless procedures described are not satisfactory and recounse must be had to operations on the central nervous evidem. There is no unanimity of opinions about the efficacy of these. Cordotomy and either postcentral certical resection or lobotomy are possible methods of sitack. With regard to cordotomy a diagnostic test can be done by ming spinal anesthesis for the lower extremity and bractisal plexus block for the upper extremity. A more

careful preliminary use of these diagnostic tests will increase the satisfactory results following cordotomy. In cases in which the pain is definitely of central origin resection of the posticentral cortex appropriate to the involved area of pain may give relief by removing the sensory cells which give rise to the phantom sensation lobotomy or interruption of the irontal association fibers may remove the patient's intrespection and concentration on his defect.

Араган Указароопки М.Д

## BRAIN AND ITS COVERINGS CRANIAL NERVES

Clarkson P., and Schorstein, J: The Treatment of Denuded Skull Table. Brit. M J 1945 2 422

The treatment of widely denuded areas of the caivarum has usually required a lengthy period of hospitalization and care because healthy granulation thissue must grow from the diploic spaces after numerous burr holes are placed through the external care.

The authors present a technique of early skin grating which had been used in a case with complete loss of scalp and pericranium over the area. Burr holes were placed only through the outer table arranged in a mosaic pattern, and connected with grooves produced with a gauge. The outer table was then chiseled away in small blocks to expose the entire diploe of the denuded area. Hemostass was obtained with hot packs however, bone wax was used in I case without detriment. This patch grafts I cm. square were then placed directly gront be diploe covered by a monadherent material and maintained in place by till gras wool or crepe. The dressings were removed on the fourth day and then changed daily until healing ensued. Good results were obtained in all a cases. Local I Woox MD.

## Wachowski, T. J., and Chenault H: Degenerative Effects of Large Doses of Roentgen Rays on the Human Brain. Radiology 1945, 45, 22

The authors have reviewed the literature from the standpoint of the effects of routgen rays on the human brain. There is a good deal of evidence to indicate that large does of roentgen rays produced definite degenerative changes in the brain. These degenerative changes in some instances were reported in association with an increase of lipochrome substance within the cells. The nerve cells were affected most and the neuroglis to a lesser extent. The blood vessels for the most part accmed unaffected. Such changes were reported following the use of 12 645 r (air) through multiple portals over a period of 5 months.

More marked degenerative changes following even larger doses included alterations in the astrocytes microglia, and possibly the ollowed nordin The authors has reported on 6 patients in 4 of whom the tumors were histologically verified prior to irradiation. Treatment consisted of the use of from 3 to 5 portals with an initial dose of 15 or increa ed over a few chys to 500? The shorter series ran 52 adys, totalling 5,000? (all 3) and 5 150? tumor dose, the longer series took 100 days with 14,840? (ai) and \$5,00? tumor dose,

Three of the cases came to autopsy and these showed extensive degenerative changes in the nerve

tissue Par

Pathological studes reported by the authors in deate that following irradiation of the brain there are widespread changes which affect all the ceilular elements. The nerve ceils of the cerebral cortex are almost universally degenerated, the least change being seen in the large flets ceils of the motor cortex. The neurogial ceils especially the protoplasmic ceils of the cortex, are fragmented and the fibrillary neur ogilal cells are swellen. Fat has accumulated in

their cytoplasm

There is an increase in the number of microglia cells of huge size with their processes inden with fat or greenish pigment. The capillaries and other small blood vessels have excessive amounts of fat in the endothetial and adventitual cells. The myellin sheaths are swollen and fragmented giving rise to accumulations of fat in the white substances. The herve fibers are also swollen and fragmented. In the adventifial spaces are accumulations of lymphocytes plasma cells and macrophages. There is therefore a degenerate v change affecting all parts of the brain and all its cellular elements even of the cerebellum.

HOWARD & BROWN MD

O Connell, J. E. A.: Lumber Puncture in the Treatment of Penetrating Wounds of the Brain. Leact Lond 045 240 389.

The dangers of lumbar puncture in intracranial hypertension have been amply set forth but the value of the procedure for control has rarel been given a great deal of consideration. Although most neurosurgeons use spinal puncture in head injuries the specific theory and indications have not been the subject of a special discussion. Penetrating wounds of the head provide material from which uch a discussion may be launched Of over 1,000 head injuries dealt with in the post hospital where the author was stationed, 150 were penetrating wounds \arious conditions arise in which lumbar puncture may be of service namely in post pera tive reduction of cerebral pressure in scalp wounds with penetration in removal of intracerebral foreign bodles, in post tranmatic cerebral abscess in un treated wounds seen after infection has set in, and in the treatment of progressive cerebral fungation.

There may be sufficient pressure from cerebral berniation on a scalp wound to cause anxiety about the strength of the nuture line. When primary bealing ha taken place the danger of cerebral lungus is passed and that anxiety need no longer be enter tained. During the period of healing lumbar pune ture will be found I value to reduce pressure on the wound. Cerebral hermation may have occurred by fore the nationt is available for treatment and the brain wound may contain various bone and metalle fragments which are inaccessible partly became a the hermation. The track containing foreign body may be compressed in the hernlated brain town Lumber puncture under these dreumstances rel reduce the hermation and open up the track of n driven fragments which makes their essential complete removal much easier. The puncture is done usmediately before the débridement is begun. \en much the same situation exists when a post true matic abacess has formed and the sinus track is tonpressed in a cerebral hermation. Lumbar paneture immediately before operation will open up the track and facilitate drainage and packing of the abuscavity The author packs such a cavity with rable sheeting in which strip gauze is inserted forming a tampon which provides drainage outside of the mi-The sheeting is changed frequently following lumber puncture. Penicillin is used locally

A patient with a penetrating wound may be as addred too ill for surgery when first seen and, late after a few days survival, his untrested wound are be infected. Such a patient is almost certain to law a cerebral hermidation through a dural defect. Lanbar puncture may be used to open up the trad, which facilitates cleaning the wound and dressing

it with a rubber sheeting tampon.

Progressive cerebral fungation is an obstinate addifficult compilication of a later penetrating weed of the head. In this case the bernation may contapart of one of the lateral rentricles. The Gilitary distorted ventrucle may in fact, be the cause of the berniation. Lumbar puncture diligently used any cause the withdrawal of the herniation and ventral into the cranial cavity.

In the cases under discussion, the lumbar purture was done under anesthesis immediately been operation and the level to which the intracrushipsure was lowered depended on the intercrushipsure was lowered depended on the was done one in the case of the case of the case of the case of the case in which the wound was kept high, and he find fatake was regulated. Puncture was not done in cases in which the wound was thought to invoice the lateral ventricle for fear of aspirating foreign as terial into it. Apart from the considerations wastered under the case of the case of the case and as a root for the introduction | pendiffi-This excellent article is well fillustrated and doemented with case reports

ADRIEN VERRECCORER, M.D.

Martin, H. and Ressa, A. B.: Treatment of Blateral Retinoblastoms (Retinal Glioma) Surjically and by Irradiation; Report on Progres. Ark. Ophik. Che., 1945. 33, 479.

The authors have made a special study of bilatory retinoblastoms and have offered 2 previous reportone in 1036 with a discussion of 6 cases, and one is 1042 in which 4 new cases were added. This article is a report of progress with regard both to the tech aloue of treatment and examination and also the end-results of such treatment. Fourteen additional

cases are discussed

The five-year end results in 9 cases treated sur geally and by irraduation are of interest in that 6 of 8 petients who were treated prior to 1939 are still living. In 1 case the cause of death may not have been connected with the original growth. Two of the 6 living ratents can see and 4 cannot.

A comprehensive table showing the location, size of the tumor treatment and end result in these 24 cases is appended. The first sign of the tumor is usually a white light reflex in the publilary region of the eye this may lead to examination and recog nition of the disease which is usually bilateral Tumors that occupy more than one quadrant of the Raused nodular fundus have a poor prognosis tumors are unlaworable. Irradiation is relied upon to a great extent and the signs of improvement under this method are described they consist chiefly of a gradual increase in the calcium content of the tumor to the point where it has the appearance of a single nodular mass of calcium resembling cottage cheese The roentgen rays must be used with caution for the eye has a limited tolerance to them. The precise method to be used is described in detail, the single dose is about 400 roentgens and the maximum total dose 8 000 roentgens X 2

It is recommended that the child be frequently reexamined and this is best done under light chloroform anesthesia. Apages Vernaugorius M.D.

## SPINAL CORD AND ITS COVERINGS

Nicenson A., and Patterson G H Spinal Cord Tumore in Children; A Study of 3 Cases of Ependymorms. J Parlat S Louis, 1945 17 315

Most medical men are of the opinion after reading authoritative works on spinil-cord tumors that these are rive in children. Among the older writers however there is evidence that these lesions oc curred more frequently in children. In modern works the percentage varies from 1 to 5 per cent, but in older works it varies from 1 to 13 per cent.

The present article has to do with 3 cases of spinal cord ependymomas in children in r of these the result was very satisfactory in that the patient is still alive after three and one-half years. The diagnostic problem is the important one for in all 3 of the cases reported the preliminary diagnosis was incorrect and treatment was instituted without improvement. Tuberculosis and poliomyelitis were the entitles mistaken for the spinal-cord tumor in these 3 cases. The history however should have green a clue, for in all of the cases the trouble com menced with pain and stiffness of the back and finally led to unmistakable symptoms. In all of the cases the spinal fluid showed increased protein muthochroma, or complete block, and it is probable that the puncture should have been undertaken for diagnostic purposes at a much earlier date

An examination of the roentgenograms of the spines showed that in all 3 there were definite changes of the pedicles which if properly assessed in the first place would have at least suggested the true nature of the complaint.

The 3 case reports are submitted and are carefully documented they should be found useful to those who are interested in this subject

ADRIEN VERBRUGGHEN M.D.

## SYMPATHETIC NERVES

Zadikoff I J., and Grayce, I: A Case of Carotid Sinus Syndrome Relieved By Operation Clia. Proc Cape Town 1945 4 253

The carotid-sums syndrome is one of the causes of syncope, and recently there has been a tendency to deal with this condition by non-surgical methods. This article contains a brief review of the pertinent literature on the subject and describes a case in which the patient was relieved by surgical measures.

Electrocardiographic changes were noted during pressure on the hipperensitive right carotid sinus of the patient. A bradycardia of 44 per minute was produced by pressure on the falus and at least one asytole lasting 3½ seconds was recorded. No at tempt was made to make preoperative tests with atropine or to novocamize the bifurcation of the common carotid artery. A penarterial sympethectomy was performed from 2 inches below the bifurcation to 2 inches above it thus the three carotid vessels were stripped for at least 2 inches. The patient had no further attacks of synope and pressure on the affected sinus did not result in any consequential changes 6 months after the operation.

The authors believe that surgical intervention has a distinct place in the treatment of this syndrome and that it must be considered in all cases of syncope. The diagnosis rests on the shillty to reproduce the syndrome by pressure on the sensitive sines.

ADMEN VERFRUGGREW M.D.

Hines, E. A. Jr. and Christiansen N. A.; Ray naud a Disease among Men. J. 4m M. 4sr 1945 teg t.

The occurrence of Ravnaud's disease in men is reported in a series of cases dating from Januar 1940 to December 1942 at the Mayo Clinic. The average modence has been 21 per cent in males and 79 per cent in females. The authors stress the importance of accurate criteris in making the diagnosis of Raynaud's disease."

Raymand's phenomenon is described as the occurrence of intermittent episodes due to a functional vascular disturbance either primary or secondary resulting in color changes of the extremitles principally the fingers and toes and less frequently the nose and ears. These episodes are initiated by exposure to cold, and less frequently by nervous or emotional strain and stress. When the condition is primary it may be referred to as Raymand's disease. derma

\ working basis for the diagnosis of this condition has been set forth in a previous publication by Allen and Brown, and is summarized as follows

1 Episodes of Raymand's phenomenon excited by cold or emotion

s Bilaterality of Raynaud's phenomenon

3 Absence of gangrene or if it is present its limitation to minimal grades of cutaneous gangrene 4 Absence of any primary disease which might be causal such as occlusive disease of the arteries crystal rib or organic disease involving the nerv

ous system
5 Symptoms of s years or longer duration
Symptoms in this series were reported as appear
ing as early as the age of 5 years and as late as 6,
years In 91 per cent of the cases exhibiting Ray
naud a phenomenon the symptoms were recorded
as having been present for 2 years in 59 per cent the
symptoms were present for 2 years in 59 per cent the
cent they were present for 2: years or longer. The
carly establishment of a correct diagnosis of Ray
naud's disease is emphasized this condition is
considered more benigm than the more serious
diseases which have Raymaud's phenomenon as a
secondary manifestation such as thromboanglitis
obliterates arteriosclerosis obliterates and selec-

The treatment depends upon the degree of in capacitation, and conservative therapy is recommended when the discuse is not too incapacitating. The patient should avoid exposure to cold or sudden changes of temperature, and should use warm, protective clothing. The direct relationship of tobacco to this condition is not clear but it is advised that patients with this condition abstain from the wed

Sympathectomy was done in a cases, with proceed relief

A detailed study of 100 unselected cases among 181 male patients was made further studies are conducted on 69 of whom 33 per cent, having his conservative treatment, showed Improvement 44 per cent were unchanged, and 23 per cent were worse. Howard A. Brown, MD. HOWARD A. Brown, MD.

## MISCELLANEOUS

Nadler S. B: Paroxyamal Headache. J Am H Ast., 1945 150 534.

Eight cases of paroxysmal temporal headach are reported they were treated surjically. Characteristic attacks started with periodic throbbing pin in the right left or both temporal regions, radating to the frontoparietal and posturorizar races, destricted and an area of the production of the results of the production of the region of the production of t

Digital compression on the temporal artery on the affected side abolathed the throbbing pain and the greater part of the continuous dull bestacke. The area in which digital compression afforded mixture relief was injected with 1 c. c. of 1 per can procus hydrochloride and this afforded complete relief to the majority of the patients.

Ligation and section of the temporal artery was then performed under general anesthesis, with reported relief of heatache varying from 2 to 11 months after operation at the time of this report. Howand A. Brows, M.D.

# SURGERY OF THE THORAX

## CHEST WALL AND BREAST

Schle, E.: On the Prognosis of the Papilloms of the Lactiferous Ducts. Acta chir scand. 1942

There has been a very considerable disagreement among pathological anatomists as to whether papil lone of the lactiferous ducts is benign or malignant. Some authorities hold that as many as 50 per cent of these papillomas develop into cancer while others maintain that it has never been proved that they

represent precancerous conditions

1

i del

The only practical way to settle the question is to re-examine patients who have had papillomas of the lactiferous ducts and on whom only local extirpa tion of the tumors has been performed. With this object in view the author examined 53 patients on whom operation had been performed for this form of papilloma Amputation of the breast had been per formed in 26 of the cases however and these were not considered in his study In the 27 other cases local extirpation had been performed. In 8 of these Cases histological examination showed very marked atypus of the cells while in the 19 others the cells were only moderately atypical. A number of microphotographs showing the histological findings are given. Re-examinations were made after from 23% to 8 years and only I case showed a recurrence. This had appeared after 43/2 years and was benign the dr picture being that of papillomatous adenoma 2 101 1

The author concludes therefore that it is not too great a risk to remove a papilloms of the lactiferous ducts by local extirpation This sparrs an organ that is of great importance to the patient both physiologic cally and esthetically It is advisable however to keep the patient under medical observation for a year or two after operation so that any recurrence

may be detected early

# TRACHEA, LUNGS, AND PLEURA

Gusterson F R.: Postoperative Chest Compiles tions Controlled Study in Hernia and Meniscectomy Operations. Lancet, Lond., 1945 249

Two hundred soldiers were operated upon in a military hospital in the course of 2 years by practi cally standard procedures and under practically identical conditions 100 for hernia and the other 100 which were included in this study merely as controls, were subjected to meniscectomy In each of these two groups 50 of the patients were given ether anesthesis and the other 50 were given gas-oxygen. For the ether the Oxford vaporizer was used which admits of a light, uniform administration the nitrous ortide and oxygen were administered in a closed circuit no suboxygenation being allowed

All patients were examined the day before opera tion with special attention to the smokers cough reported by Morton (Lance Lond, 1944 1 358) When the subjects had a history of recent coryza, they were not operated upon for at least a week after the symptoms had subsided Those with a history of chronic bronchltis with sputum or with any chronic respiratory disease such as mild emphysema were all classed as having major preoperative respiratory complications, even though there were no signs of active disease Early exercises were insisted upon and the stay in bed was 14 days in all cases. During the first 7 days the temperatures were recorded every four hours. The number of times a patient vomited was recorded by obser vation not by the patient s statements.

It was found that following herniorrhaphy tem peratures from 90 F to 101 F inclusive developed in 14, 21 and 7 cases done under ether anesthesis, and in 15 22 and 6 cases done under gas-oxygen and thesis. Eight of the patients operated upon under ether and 7 under gas-oxygen developed tempera tures of over 101 F Of the patients subjected to meniscectomy, none developed a temperature of more than ror F 5 under ether anesthesia but none under gas-oxygen, developed temperatures of 101 F Twenty three under ether and 18 under gas-oxygen developed temperatures of 100 F and 22 each under ether and under gas-oxygen had temperatures of

Thus, it was found that in neither series was the incidence of chest complications any higher whether ether or gas-oxygen anesthesia was used There was a higher incidence of preoperative chest compil cations (43 minor 7 major) in the hernia series than in the meniscectomies (15 minor 2 major), the number of cases developing major chest conditions was roughly doubled following hernforthaphy in respective of the anesthetic agent, which suggested a distinct liability to postoperative chest compli-cations in the cases of hernia. However in no case were the full classical signs of lobar atelectasis found perhaps because treatment (see original ar tide) was instituted at once. The presence of such a high incidence of preoperative chest complications in cases suggesting a liability to postoperative chest complications does, however emphasize the need of a careful survey of each patient before operation and the fact that reliance must be placed on very careful postoperative routine rather than on the choice of any particular technique of anesthesia if the incidence of postoperative chest morbidity is

The incidence of postoperative vomiting was to be reduced studied under the impression that patients who did not vomit were more liable to develop a chest con dition, and the only postoperative difference which could be attributed to the anesthetic was found to be a slightly higher incidence of postoperative vomiting after ether

The author concludes from this study that the use of ether as an anesthetic does not increase the use of ether as an anesthetic does not increase the use of the lung or of any other chest complication following hernia operations, provided only the lightest necessary plane of anothersus is maintained.

JOHN W. BERNYL, M.D.

#### Aronovitch M: Medical Treatment of Postoper ative Pulmonary Atelectasis. Ca ed M Att J 1945 53 2

Postoperative at electasis is still the most important acute collapse of the lung which may occur Its treatment properly consists in prevention. This entally proper preoperative hy gene of the nose and throat and the careful selection of cases for surgery Very important however is the immediate post operative care which is usually administered by the aneithetist and usually consists of carbon dioxide inhalations and the aspiration of mucus from the nasopharynx throat and deeper structures if neccusary

In apite of all precautions polimonary collapse will till occur in a certain proportion of cases. The immediate cause of the collapse is conceded to be a plug of mucus or fibrin and mucus which seals one if the larger r small's bronch! The contributing factors to this evant may be many and accordingly various theories have been advanced to explain why this plug whould occasionally occur.

No matter bow the bronchial plug is formed the result is th same. Air in the alveoli distal to the plug is absorbed and collapse of these alveoli occurs. The clinician is then confronted with a patient who exhibits the familiar picture of postoperative atelectasis with its fever shallow respirations evanosis and chest pain.

The problem is to remove the plag. Once this is gone the affected alveoli will usually re-expand and all symptoms disappear. Brouchoscopic aspiration can of course be done and must always remain as the final method of choice when others fall, but it is usually unnecessary to resort to this measure which is in itself an operation.

Sometimes exceedingly simple procedures such a slap on the back, encouraging a hard coughing spell, or posturing the patient will dislodge a bron chial plug. Often however these measures fall and in such cases a more detailed knowledge of the mechanics f the bronchial tree may and in rational therapy.

Once the plug i brmly in the bronchus and atelectus has occurred it may be assumed that there is a great deal of spusm Indeed it is this bronchish pa m which probably contributes greatly to the shall we replications and examples seen in these cases Bronchorga m I an important factor which mu!

Bronchospa m i an important factor which mu t be considered and must be eliminated in any rational treatment

Another important fact which must be considered is the dry viscid nature of the plug. Two other factors must be considered. One is gravity but a more important factor is the intrabronchial pressure proximal and divid to the pley Arbectasis having taken place by absorption of the air dustal to the plug, intrabronchial pressure and pressure from the surrounding structures will tend to drive the plug in deeper Am expubric force to drive the plug out of the bronchus should therefore be considered.

An attempt can be made to remedy each of three factors and the resultant combined action is often successful in curing the atelectasm

It is not expected that the plug liself once formed, can be easily liquefied but if the bronchial muces can be made to secrete a thin water, fluid the will surround the adherent plug and the latter will the tend to float off One-half ounce of mittern of anmonlum chloride every 4 hours is helpful in achier ing this objective.

The most powerful agent in relating the broachid musculature is adrenaine. Epidenne is satisfator, however. Given hypodermically in a dosage of § gradient in the strength of the satisfator is best given some time after the especiant so that bronchis secretion is already present. Twent minutes or thereshouts should be allowed between the oral expectorant and the hypodermic broachoolistor which is repeated every a bound the silvent of the production of the pro

Gravity and expulsive force can now be called in caid in the expulsion of the plug by postning the patient and encouraging him to cough for some or mainter after the bromchodilator is given it his to be repeated hourly. This method will not succeed as III cases but it is well worth a trial. If it fails and the patient has no relief after 24 hours broaded except expursion can always be done. There is northy in delaying bronchescopic aspiration for this length of time even if the patient is somewhat uncomfort able provided the possibility of tung supportions can be minimized. Adequate prophysical doses of sulfathlazole or sulfathlazole or sulfathlazole or sulfathlazole or sulfathlazole or sulfathlazole but the therapy.

## Kay, E. B. and Meade R. H., Jr t Penkillin in Infections of the Lungs and Bronchi J 4 M Arr. 945 29 200.

Kay and Meade treated og patients having chroskinfections of the lungs and bronchi with peniclia-Forty five of these patients had bronchectast, 17 had lung abscesses 6 had suppraritive pneumonitito had chronic bronchitts and 3 fungous infections Peniclilla is of unparalleled value in the treatment of acute pulmonary infections but as athonistiv deoff acute pulmonary infections but as athonistiv de-

of acute pulmonary infection to the third revelops it becomes less effective. Chronicity in pulmonary infections introduces factors not found during the acute stage, which influence the efficacy of penicifilm therapy. They are the mechanical factor of these destruction, fibrosis avascularity and bronchial occlusion.

Pencilin appears to be of value in the treatment of acute exercitations of chronic infections super imposed attacks of bronchopneumonus chronic bron chitis minimal bronchlectasis and advanced bron chiectasis too widespread for pulmonary resection. It is also of value in preparing the patient for operation as an adjunct to surgery making possible operative intervention otherwise impossible and in decreasing the postoperative complications.

Penicillin is of no permanent value in the treat ment of advanced bronchiectasis nor should pul monary resection be withheld when indicated be cause of the false sense of security resulting from

temporary benefit.

In the treatment of pulmonary suppuration, chronic long abscesses and fungous infections the chief value of penicillin is its ability to decrease the general manifestations of toxicity to promote symptomatic improvement and to prepare the patient for operative interpention.

The intratracheal administration of pencillin in the treatment of chronic bronchits and bronchects as appeared to give more benefit in many cases than intransicular administration. As much as from 30,000 to 30,000 Oxford units of pencillin can be applied daily in one application to the tracheobronchist iree. Excellent results were obtained in patients with chronic bronchitis and minimal bronchiectasis by the use of this method.

STEPREM A ZIPMAN MLD

Randolph V S.1 The Drainage of Cavities in Biinterni Pulmonary Tuberculosis. J. Thorac Surg. 1045, 14, 305

In blateral pulmonary tube realisms the treatment of cavites is often the most serious problem and it is frequently insurmountable. Many patients with blateral disease have been successfully treated with blateral articleal pneumothorax. It is often nec casary to sever adhesions on one or both sides of the chest in order to make the collapse successful.

When pneumothorax cannot be used because of too extensive adhesions it is necessary when con sidering other forms of collapse to study the patient from the standpoint of preserving adequate lung space. In the treatment of cavities at or very near the apex, bilateral extrapleural pneumolysis and extrapleural pneumolysis in which sufficient long space may be saved bilateral thoracoplasty has been employed

However if the cavity to be treated lies in the lower part of the upper lobe a middle lobe, or the upper part of the lower lobe these collapse methods are not available because collapsing the cavity will also collapse loo much instead long. In these cases some type of cuvity drainage must be used. Open drainage of tuberculous cavities has ordinarily been disastrous but by the use of closed catheter drain age many cavity closures have been reported how ever in many cases there has been a reopening of the cavities after the original closure.

In 2 cases of bilateral pulmonary tuberculosis which were not suntable for any form of collapse therapy the Electer flap draunage was used. In both cases the results were excellent. The field of this operation is definitely limited. It has hitherto been used on only one side of the chest when it has been possible to control the tuberculosis on the other side. However it may be of value for use on both sides of the chest. This form of draunage has the advantage of being a simple procedure and one which does not require close continuous aftereare.

SAUTURE KARR M.D.

Thomas, J. W., Van Ordstrand H. S., and Tomlin son C.: The Treatment of Bronchiectusis with Chemotherapy and Allergy Management Ass. Int M. 1945 23, 405

An evaluation by follow up examination and questionnaires was made of 75 cases of bronchectasis treated by sulfonamides and or allergic management. In 13 of these cases operations had been recommended but they had been refused or post poned the remaining cases had been considered nonsurgical because of minimal or advanced disease age and general conditions. The periods of observation varied from 4 months to 5 years the majority of the cases being observed for 2 years at least most of the patients had had the disease 5 years to fonger.

In 57 cases, lipsodol bronchographs and bronchoe copy established the diagnosis while in the remainder of the cases the diagnosis was made by means of the history physical exmination absence of tuberde bacilli and fungi in the aputum and stereoscopic and plain chest films (which are at best only suggestive evidence). In one half of the cases the nonhemolytic streptococcus streptococcus with dams and the hemolytic streptococcus were found one fourth showed the pneumococcus and some showed the fusiform bacillius spirochaeta neisseria catarrhaiss staphivlococcus albus and haemophillus influenzae. Fifty five of the patients had essociated majoriespiratory allergy including bronchials thma, perennual allergic bronchitis and severe perennual allergic bronchitis.

Treatment consisted of palliative measures to reduce polimonary infection to a minimum and to irradicate obstruction ie treatment of sinusities and oral sepsis rest adequate diet and vitamins and postural drainage Sulfonsdiazine or sulfathia sole was used in most instances the average courses were 7 gr (0 3 gm) four times deliv for 4 weeks repeated from 0 to 9 times at intervals of from three to four months. Allergy management consisted of thorough investigation and avoidance of important offending allergens in the patients en vironment difficulty restrictions hypotensitization with extracts and autogenous vaccinations. These measures were followed for periods varying from 4 months to 347 years.

The summary reveals the following results in addition to the preceding facts

I Twenty-three cases received sulfons mide drugs as the chief or only therapeutic measure. Twenty two of these showed definite improvement with re duction of cough and expectoration while under treatment.

Twenty-one cases were treated chiefly or wholly with allergy management. Fifteen of this group showed frank improvement with reduction in cough and expectoration.

3 In 31 cases combined allergy and sulfonsmide therapy was used Twenty-six showed at least from 25 to 100 per cent improvement in cough and expectoration.

4. Recurrences of symptoms of original sever ity were frequently noted following acute respiratory infections cessation of allerey management, or in some cases when infrequent courses of sulfons mide drugs were used. JAY BARTLETT M.D.

#### Tinney W S., and McDonald, J R.: Putmonary Metastasis of Carcinoma Disgnosed by Bron choecopy Minnersta M 1945 18 554

In a cases a metastatic lesion from carcinoma ul cerated through some portion of the tracheobron chial mucosa. The first case was probably an example of direct invasion of the traches by car cinoma of the thyroid and the second case was an example of carcinoma of the breast with metastasis to the bronchial mucosa.

The third case was the most interesting one in this series. The metastatic lesion in the lung was diagnosed a years after nephrectomy for hyper nephroma and there was no evidence of recurrence or metastasis a years after nneumonectomy for the metastatic tumor

In all of these cases metastasis to the tracheobronchial tree was diagnosed on bronchoscopic ex amination and biopsy of tissue obtained bronchoscopically confirmed the diagnosis

#### Griess, D F., McDonald J R., and Clagett, O T: The Proximal Extension of Carcinoms of the Lung in the Bronchial Wall. J Therec. Surg 945, 14 362

This study was based on 55 cases of carcinoma of the lung in which the surgical specimens were examined microscopically to determine the proximal extension of the malignant lesion along the bronchial wall. Only 30 of the 55 cases were included in the final survey In the remaining 25 cases the specimens had been mutilated by previous investigation or the carcinoma obviously did not involve a bron chus. The following types of tumor were encount ered in the to cases a squamous cell epithelioma in 16 or 33 per cent an adenocarcinoma in 6 or 20 per cent, an adenoma in 7 or 23 per cent and an anaplastic type of carcinoma in 1 case or 3 per cent respectively

Although adenocarcinomas are considered more malignant than are squamous cell epitheliomas the tumor had extended proximally in 10, or 62 percent of the 16 cases of squamous cell epithelioms as com-

pared with 3 or 50 per cent of the 6 cases of adenocarcinoma. The adenocarcinomas however, extended a greater average distance proximally than did the squamous cell epitheliomas Of the 16 squamous epitheliomes 5 were grade 2 and 11 acre grade 3 Of the 6 adenocarcinomas, 1 was grade 1, 4 were grade 3 and 1 was grade 4. Proximal extension did not occur in the case in which the adencer cinoma was grade 4. This is in agreement with the finding of New and Fletcher in cases of carcinoms of the larynz, and with that of Conway and Broders in cases of carcinoma of the urinary bladder namely that carcinomas that are of grade 4 are not as pronto spread by direct extension as are those of grade ;

There was no evidence of extension in the roses of adenoma or in the case in which an anaphatic

type of carcinoma was encountered.

In 8 cases extension occurred in the outer fibron coat only in 3, it occurred in the mucosal coat only in 1 case it occurred in the submuces and in 1. It occurred in both the submucosa and the outer fibrous

When dealing with adenocarcinomas the surgent should, if anatomically possible, sever the broaches more than a cm proximal from the gross limits of the lesson. If the tumor is a squamous cell epitheliom, a safe distance to sever the bronchus would be at least 1 c cm.

# Neuhof IL, and State, D: Putrid Empyems without Foul Sputum. Surgery 945 18 411

The diagnosis of putrid empyema in the absence of foul sputum or other evidence of a pulmonary abscess is difficult. The lesion should be suspected and efforts at diagnose should continue as long as a given set of clinical manifestations are present These consist primarily of outstanding and per sistent chest pain slight cough and expectoration and an illness which is severe at least in the initial stage Cough may be absent the course may be chronic. The discovery of foul pus by aspiration of the pleura is the sole method of establishing the diagnosis This disclosure will often be a surpere. Wide drainage of the main lesion and its ramifica tions will effect a cure unless the diagnosis has been delayed too long Although a pulmonary abaces b not demonstrable a putrid pulmonary abaces is the precursor of 'surprise" putrid empyema.

# STREETS A. ZIEMON M.D. Collis, J L., Davison M H. A., and Smith P 8.1 The Management of Traumatic Pyothers.

Laucet, Lond 945 248 778.

The 44 cases on which this article is based are instances of total or almost total pythorax and do not include patients with early infected hemothers. The high mortality of 17 per cent (13 cases) emphs sizes the importance of this condition. The author experience has led them to believe that a localized empyema is sometimes unavoidable, but that total pyothorax with the possible exception of cases associated with esophageal injury or very virulest organisms such as the hemolytic clostridium welchi is an avoidable condition. In other words if pul monary expansion is effected and maintained from the onset of treatment infection can produce only

a localized empyema.

In cases of closed pyothorax aspiration is carried out for the first few days penicilin being introduced into the pleura after aspiration on alternate days The aspirations may be necessary daily or on alter nate days according to the rate of collection of fluid, and are followed every forty-eight hours by the introduction into the pleural cavity of 50 000 units of penicillin in a c.c. of water. At the last aspiration before drainage 20 c.c of lodized poppy seed oil is introduced and posteroanterior and lateral roentgenograms are taken. A portion of the ninth or tenth rib is then resected all clot removed and drainage instituted just under the lateral edge of the erector spinae. Breathing exercises are started at once. The incision is vertical for two reasons. The first is that it heals better this way if a horizontal incision is made serous fluid or pus can collect under the lower edge but if the inclaion is vertical outward drainage takes place more readily along the line of the incision. The second reason is that after a vertical incision is made it is easy to resect a portion of the rib one higher or lower if the first rib resection is found to be unsuit ably placed. Although local anesthesia was used at first for these operations it has been given up in favor of cyclopropane.

A method of iwo-tube drainage with an additional apical tube allows the cavity to be washed out and prevents the drain from becoming blocked JOSUPH K. NARAY M.D.

Hirshfeld J W Buggs, C. W Abbott W E., and Pilling, M A.: Penicillin in the Treatment of Emprena. J Am. M Am. 1945, 128, 577

Penicilin is a powerful antibacterial agent and almost nontone for man. It is not inhibited by pus or other products of hasse destruction. After intravenous or intramuscular administration penicilim penetrates poorly into collections of pus, but if it is injected directly into an absense considerable concentrations penist for from 2s to 28 hours.

In order to effect a cure of pleural emprens by penicilin therapy aione the causative bacters must be usceptible to penicillin, the emprena cavity must not be localisted nor contain preces of necrotic ling or large clots of fibrin, a peristent broachial fathlis must not be present (because of constant reinfection of the cavity) and the lungs must be capable of re-expanding in order to obliterate the cavity. If the pleurs becomes so thick that the lung cannot re-expand, operation is necessary in order to move the chest wall in to meet the lung.

Thirteen cases are reported In spite of the in stillations of 50 000 units of penicillin after apprations several cases required no resection. In case, this was required because of the reappearance of preumococci after three weeks of very intensive penicillin therapy both intrapleural and intramucular. In a other case multiple bronchopleural fistulas prevented complete re-expansion of the lung and low grade fever penisted in these cases penicil lin comiderably improved the patient's general condition and made rib resection a safe procedure. In a 2 year-old white girl, nb resection was per formed because of lack of improvement after 6 days of penicilin therapy. This was followed by a rapid drop of temperature to normal and steady improvement. In another case infection of the chest wall following repeated aspirations made nb resection advisable.

Two patients in this series of 13 died as the result of empyema, I during the course of pencellin treatment and the other after no resection the immediate causes of death were pulmonary hemorrhage and multiple pulmonary infarcts respectively. ARTHOR J. LEGER, M.D.

#### HEART AND PERICARDIUM

Lam, C. R.t. Large Anomalous Vein (Laft Vens Cars.) Encountered in Operation for Ligation of Patent Ductus Arteriosus. J. Therac. Surg., 1945. 14, 393.

During the course of operation on a patient suffering from a patent ductus arteriosus with subacute bacterial endocarditis a large anomalous vein was

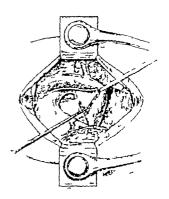


Fig 1 Semidingrammatic view of findings at operation showing the "left vens cava" being held away with the tape to expose the ductus arteriosus, which is in the curve of the aneutyson needle.

seen lying on the norta, and following a course parallel to it. Its diameter was only slightly less than that of the norta. Medially it disappeared into the arcolar tissue of the mediatismum and appeared to enter the pericardium to the right of the norta. It received at least one large branch from the neck There was no pulsation or thrill in the vein and it collapsed with slight pressure.

Peniatent left superior vena cava has pteviously been reported but no mention has hitherto been made of a left inferior vena cava. The author believes that the simplest explanation for the ven in this case is to assume that it represents the left in nominate vein and persistence of a left cardiac vein.

SURVEL KARN MD

Urachel D L. Bondy P K., and Safley S. M : Acute Pericarditis. \ Lugland J M : 1945 233 399-

Eight cases of acute percarditis were studied within three months at the Battey General Hospital Rome. Georgia The chinical x-ray and electro-cardiographic alterations followed variable sequences in the different cases variations incompletely described in textbooks. Since the diagnosis of acute percarditis is often dufficult the authors present these cases to emphasize the variable sequence of x-ray clinical, and electrocardiographic findings and also to demonstrate the relatively benign in ture of certain cases of pericarditis when treated by modern methods.

Scott, Feil, and Katz, in 1929 first described the RS-T elevation occurring early in a case of hemopericardium and in one of purulent pericarditis attributing it to myocardial ischemia produced by pressure These changes indicate recent effusion or a gross effusion which will not allow further stretch ing of the pericardium Foulger and Foulger, in 020, showed that this change was temporary since the electrocardiogram returns to normal unless the intrapencardial pressure is maintained. Fowler Rathe, and Smith in 1933 correlated the Twave changes in experimental pericarditis with the in flammatory reaction in the subepleardial myocar dium. They also showed that when the myocarditis subsided and the inflamed area became fibrous the T waves returned to normal

Bellet and Mcallilan, in 1938 showed that the cleration of the RST seprent was transient and manily associated with rayidly developing types of periordith. Inversion of the T wave probably was associated with the subchronic stage and occurred when healing was taking place and the general tozemia was less. Vandet (see and Norris showed that the electrocardiogram might return almost to normal even though the infection and inflammation of the pericardial sac continued and the divation in creased. Elevations of the RST segment have not been observed in turberculous pericarditis.

This series consists of 8 cases, all men between 2 and 27 6 white and 2 negro. The causative organ ism was the tubercle bacillus in one case the menin-

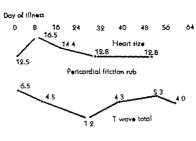
geoccus in another and the pneumococcus in the third case. The organism was presumed to be tuber culous in z cases and theumatic in 3. These cases were studied by graphs correlating the beatt me the sum of the T waves the elevation of the RST agments, the highest temperature daily and the time of pericardial friction rules (Fig. 1). The 8 cases are reported in detail.

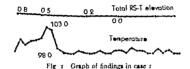
Cases 1 2 and 3 although caused by different etiological agents graphically presented similar pictures The heart increased rapidly in size in all reaching its maximum at ten days. At this time there was little or no change in the electrocardogram although some elevation of the RS-T segment had occurred in cases 1 and 2. The maximum T wave inversion occurred in all a after the heart returned to original size. T wave inversion some times occurs after the temperature has returned to pormal and the patient is clinically well. Cases t and a illustrated the The Twave total in case : was positi e throughout and n single electrous diogram was typical of pericarditis. Only by repeated examinations could the characteristic picture he demonstrated on the graphic chart. This empha sizes the point that the diagnosis i pericarditis by means of electrocardiograms is frequently imposible without repeated examinations

In case 4 the patient, presumably with tuber culous polyserositis continued to run a low grade fever after 2 months of illness. The T wave showed a maximum inversion after the beart returned to normal size and remained inverted as long as beginned to the patient was under observation during which time the pericarditis continued to be active. In case, the T waves remained low for 9 months during which time there was clinical evidence of activity of the themselved process.

the rheumatoid process Case 6 a severe rheumatic periorditis showed that the heart had reached its maximum size and returning to normal before the T waves reached their lowest point. The seventh case was the only one to show a maximum T wave inversion before the heart reached its greatest size Early T wave inverses was followed by nearly isoelectric waves and then by more marked inversion. This rapid electrocardiographic alteration occasionally is seen in acute myocarditis secondary to rheumatic fever or invocardial infarction, but was not seen in the other cases studied. Possibly the early inversion may have been caused by rapidly accomulating fluid in a percardial sac that could not stretch. This heart never became particularly large in splte of a severe degree of T wave inversion, and no evidence of cardiac tamponade appeared at that time. This patient was first seen on his sixtieth day of illness with a normal sized heart, no fever T wave inversion, and normal white blood count and sedimentation rate. The T waves became upright in 4 weeks

Case 8 followed a typical pattern for a months: The electrocardiograms showed a rapidly progressive increase in the T wave inversion till the twenty ninth day. The inversion t taled 11 5 mm, and was





the most marked in the series. From the twenty ninth to the fifty first day it decreased and then remained unchanged. The sedimentation rate was normal by the thirty first day and the heart was

normal by the thirty-eighth day

The first change generally referred to in textbooks is the elevation of the RS-T segment. It was noted in 5 of 7 cases the highest being 2 o mm. The change was transient and persisted from 6 to 30 days. It should be carefully searched for in every suspected case of pericardial inflammation since it is the first demonstrable change. However, normal persons may show this finding and therefore serial electrocardiograms are often necessary before an accurate diagnosis can be established.

In this series the maximum T wave inversion came between the sixteenth and forty third days of disease the average time being the twenty-seventh day. This time interval is important since a patient with acute perioriditis may die long before diagnostic. Twave inversion does not involve all four leads and occa sionally only one or two are inverted. There is usually some reduction in the total T wave deflection which can be shown by careful measurements in sexual electrocardiograms.

In 5 cases the T waves returned to normal in an average of 50 days. In 1 case they remained low for 9 months in another they remained inverted for 10 weeks and in a third case for 5 months. The authors

are not certain about the significance of persistent T wave inversion long after the temperature pulse chest x say film white cell count and sedimentation rate have become normal. These changes may be similar to those in cases of myocardial infarction in which. T wave deviations may periant for many months after the acute incident. The authors be lieve however that persistent inversion must be regarded with caution and for this reason they re strict the patients activities until the T waves return to normal.

There was no consistent variation in the QRS amplitude although a lowered total deflection has been mentioned as a diagnostic sign in acute periodicial.

The heart rapidly reached its maximum size in this series. In 2 of the cases the pencardium was tapped to demonstrate fund. In all of the others there was a roentgenological diagnosis of pericarditis with effusion.

The pericardial fraction rub appeared from the accound to thirteenth day of disease in this series. It persisted for a period of from 4 to 16 days with an average of 9 days. Only 1 case failed to show a pericardial rub.

As judged from the cases observed there is no significant electrocardiographic difference in the pericarditis caused by rheumatic fever tuberculosis or pneumococcal or meningococcal infection.

ROBERT R. BIGIELOW M.D.

#### ESOPHAGUS AND MEDIASTINUM

Adams, R., and Hoover W B.: Benign Tumors of th Ecophagus, J Thersc. Surg 1945, 4 279

Beingn tumor of the exophagus is a rare disease, when considered in terms of the total number of reported cases the frequency in respect to all exophageal tumors or the percentage of all patients with exophageal symptoms in whom the cause is a benign tumor However these lesions comprise an important clinical group because they are readily curable by proper surgical management. They are interesting from the standpoint of differential diagnosts proguests and rarity and are a challenge to the surgeon who finds pleasure in detecting and correcting the bizarre allment. The grand total known to us is or cases.

From 1933 to 1935 the percentage of cases diag noted during life was higher, which is explained by the increasingly widespread use of the precision methods of diagnosis—huborscopy with barma and cooping-scopy. Also the number of cases adsorvered and recorded during the last 11 years is over one-half as large as the number of cases reported in the pre-

ceding 220 years. Three cases are reported in detail. The symptoms of all esophageal lesions are so similar that they usually afford little differential diagnostic information. A small tumor rarely exuses any symptoms and unless discovered incidentally in the course of fluorescopic examination its presence ordinarily is not suspected until its size interferes with swallowing. In reviewing cases of carcinoma of the esophagus and the literature of benign esophereal tumors one is impressed with the fre quency with which patients have been considered neurotic (globus hystericus) until they began to regurgitate solid food Dyspharia appears much more slowly with benign tumors than with car cinoma. This is partly explained by the facts that the rate of growth as a rule is much less rapid, and that ulceration, while common and extensive with cancer is late and minimal with benign tumor Case allostrates the dramatic nature that symptoms may assume if torsion of the pedicle or trauma to the body of a pedunculated benign tumor induces venous obstruction and edems.

The a patients had no helpful physical signs but in all of them the roentgenological studies with barium brought out characteristic features of benisu esophageal tumors. The walls of the esophagus appear elastic. Peristaltic waves pass through the tumor-bearing region. Even with a large intramural growth in one wall of the esophagus the wall directly opposite is covered with normal mucosa As shown by the s intraluminal cases barium flows evenly around the tumors. As is evident in the roentgenograms in case a a thin stream of barium outlined each lateral margin of the growth with no break in the regular mucosal pattern, except at the upper margin of the negative intraliminal shadow where a film of barium seemed to be fitted as a cap over the superior tumor surface. One needs only to compare these roentgenograms with similar ones showing the narrow thick, irregular channel in the presence of a carefnoma in the same region to realize how definitely they differ in appearance

The extiruction of each of these lesions present some problem peculiar to location pathology and the anatomy of the esophagus. In case 1 an into mural fibroms. It had to be determined with ortainty from which organ the tumor arose and after its localization to the wall of the esophagus, it us removed with preservation of an intact muova. In case 3 a pedunculated polyp an easy and and anodecopic operation, instead of a hazardous extend operation through the incased cervical esophaga, depended upon the suspension laryngoscope for good exposure and upon the electrocoagulating sam for reliable hemostasis.

In case a an intraluminal fibroma, the problem was somewhat more involved. The tumor was to large to be removed endoscopically and it was situated too low to be reached through an incivic in the neck. Yet such a tumor must be removed with maintenance of the esophageal continuity or or must accept the alternative of an esophaged restrict accept the alternative of an esophaged external etophagealistic gastrottomy and external etophagealistic particular thors mutuallian, and frequent disappointment.

In order to avoid fatal pertoperative nediarthinkrigid asepsis and perfect healing must be athered. As a contribution to the attainment of these kinds, the esophagus should be defunctioned during the periods of preoperative esophages it stellings the ast postoperative healing. Finally one must be able to operate in the upper pesterior mediastimum a regia admittedly difficult of singlest access with the wirexposure prerequisite to plantaking and asepte technique. Each patient recovered without cosnilication.

The literature of benign tumors of the esophagus is reviewed. Various diagnostic and technical problems arising in the management of such cases along the contract of the cont

### MISCELLANEOUS

Titche, L. L.; Postbronchoscopic Reactions. Am. Otal. Rhinal., 945, 59; 563.

The use of the bronchoscope for diagnosh and treatment of bronchopulmonary discuse is well corered in the literature but there are a few articles emphasizing the harmful effects of this procedure. Bronchoscopy offers a simple and direct means of

Bronchoscopy offers a simple and direct means investigating bronchopulmonary disease since a lesion of the parenchyma always results in change of the mucus membrane of the draining bronching by watching these changes one can study the charac

ter and progress of ining lesions

Bronchescopy was performed by the author for
diagnosis in cases in which the sputum was negative
but the x-rays revealed tuberculosis, as a roethe
prethoracoplasty procedure, and for diagnosis and
treatment of endobronchial tuberculosis Broachos

copy was employed for diagnosis in nontuberculous lesions and as part of the treatment of bronchiectasis and of asthmatic patients for the aspuration

of secretions

From January 1 1943 to January 1 1945 367 bronchoscopies were performed on 214 patients. Two hundred and forty five of these were for 147 tuber culous patients. Of this group, 103 showed a tibe in temperature—91 during the first 72 hours and the remaining 12 up to the eighth postbronchoscopic day. This temperature rise varied from 2/4 degrees in 3 cases the elevation did not persist past the day of the procedure in 36 the temperature returned to normal the next day in 17 by the second day and in 15 by the third day.

In addition to this initial rise 22 cases showed a secondary rise after the temperature returned to normal In 16 cases this rise occurred between the ninth and thirteenth days following bronchosopy in 3 it occurred on the fifth day and in 1 case each on the seventh eighth fourteenth and fifteenth days The temperature elevations ranged from ½ to degrees and lasted from 10 42 days In 15 cases the temperature subsided within a week and in 5 others by the end of the second week. One patient had an elevated temperature until the forty-second

of the patients with a secondary rise 4 showed an extension of the disease in the lungs on x ray ex amination. The author reports these cases in detail.

In attempting to see whether these reactions were caused primarily because the patients were tuber

culous, the author studied the records of 67 patients with bronchiectasis asthma, pulmonary malig nancies long abscess or chronic bronchitis. A total of 116 bronchoscopies was done on this group and 32 showed temperature rises in the first week—32 of which occurred during the first 72 hours. This rise ranged from ½ degrees to 4 degrees. In 36 cases, the temperature returned to normal in 1 week and in only 2 of these was there a secondary rise in temperature.

The initial rise in temperature in a majority of instances is due to the trauma of instrumentation as evidenced by the similarity of the reactions in tuberculous and nontuberculous patients. The secondary rise in tuberculous patients is an important sign and appears to indicate a spread or activation of the disease. In the nontuberculous patients the secondary rise can be attributed to reactivation of the infection or to a secondary infection resulting

from the instrumentation.

In order to prevent the further occurrence of these reactions, the author augests a more careful selection of patients for brouchescopy a minimum of trauma during instrumentation and encouraging the patients to clear the tracheolomchial tree of secretions as soon as possible. Many believe that the disturbance of the cough reflex may be associated with the februle response and extension of tuberculous disease. The author thinks that the minimum quantity of anesthetic necessary should always be used in order to disturb the cough reflex as little as possible.

ROSELER, ROSELOR, ROSELOR, BROTGLOW, M.D.

sufficient reward. If the closure of the perforation causes too great a narrowing of the duodenum the addition of a gastroenterostomy is needed but other arguments in its favor such as relief from future ulcer symptoms, earlier feeding and obviating of future operation, seem unsound. The same probably holds true for excision and pyloroplasty. The a patients on whom gastroenterostomy was done lived.

In many reports, gastric resection has above the lowest mortality. Nevertheless, it is doubtful that this operation should ordinarily be given serious consideration. Gastrectomy is a highly technical operation which is not applicable for the average case treated under emergency conditions by the average emergency staff.

In conclusion the authors state that

1 It should be possible to lower our mortality high mortality may be due to relative unfamiliarity with the surpical technique, to a delay in surgery and perionocal infection has set in, or to a mirrate in diagnosis resulting in the wrong approach with a consequent longer and less accurate operation. Leaving out age and other angles beyond our comtrol, the time clapsing between perforation, and operation is the most important factor affecting the results of the individual operator.

 A correct diagnosis can usually be made as the clinical features are so striking as to make it apparent that a surgical emergency exists. In the great majority free air in the abdominal cavity can be shown by x ray if one whites additional subport.
 White wides resertion was have it as all properties.

3 While radical reaction may have its place in selected case in the best surgical dunks, the routine treatment should be the earliest possible and the simplest thorough docure with the best supportive preoperative and postoperative treatment.

4. Recurrence of ulcer symptoms will take place in the majority of patients. In the event of ulcer recurrence the proper medical treatment can be out lined and if surgery becomes necessary the best operation for the condition can be chosen after due deliberation and study and after proper preparation.

Udsondo, C. B. and Naslo, J.: The Incidence of Castric and Duodenal Ulcer in Different professions and Occupations (Incidencia de la dicera gástrica y duodenal en las professoes y ficios) P eute méd. ergen 945, 33 58

The authors have made a careful study of the profession or occupation of a gry patients with gate trie and duotienal ulcern and give tables showing the details of their findings. These ulcern are more for quent among professional people than among physical workers and among all the professional people they are most frequent in public officials, probably because of the psychic demands made on them. A study of the cases in physical workers, in whom ulcers are less frequent than in psychic and intellectual workers, shows that gastite and duodenal ulcers are not caused by repeated microtrauma of the epigantic region as has frequently been claimed.

Among the professional people with ulcer tien are many more male than female patient. The localization of the ulcer is related to a certain ertes to the patient a occupation, duodmail ulcer bein more frequent in professional people and patie ulcer in workmen. Domestic work is classified in spychophysical and most of the patients in the group are women. They show a predominance of gratic ulcer.

A bad course of the ulcer is more frequent in professional workers than in workers of the physical and psychophysical groups. This also tends to diprove the theory that violence is involved in the causation of ulcer. A bad course does not seem to be

related to sex or localization of the ulcer Recurrences were more frequent after one opention in the physical workers and after two opening in the professional workers. Among the few case a which three openations were performed there were more physical workers with recurrences.

A hyperand type of gastric secretion preforinated in the physical workers, a normal and curin the psychic workers, and hypocade or normal add curve in the psychophysical groups. Most per per cent of the patients showed some habt tending to cause alimentary intordication, such as the weak tobsecto alcohol, mate, or coffee. The use of alcohol or tobsecto alcohol, mate, or coffee. The use of alcohol workers and of coffee among the psychic workers. The use of tobacco or mate did not seem to have any needal tendency to cause alcres.

AUDRET G. MORGAN, M.D.

Dailey M. E., and Miller E. R.: A Search in Symptomices Gastric Cancer in 500 Appured; Healthy Man of 45 and Over Gastrochrists 1945 5 1

The authors, in an attempt to discover muirs (early) gustric mailgnancies, examined 500 norms men by a burium meal examination the rationabeing precisely that of a mass chest survey with the subjects were 40 years or over and were live of digestive complaints. All were examined by the barium meal procedure and fluoroscopy A fall gastrointestinal series was performed whenever I halt of abnormality was present.

The findings revealed that 3 men of 500 appears to have penistent gastric lesions—one had a gattin ider another a suspected control polyp and is third had antrai gastritis— the last being venice by resection.

While the authors work was in progress, St. John Svermon and Harrey uncovered g gattle may nancies among says men and women. However the individuals in their survey were not necessary asymptomatic. Righer at the same time discovered in routine x-ray examination of the at mach, it gastric cancers and 15 polypa among 317 patient with permicious anemia.

The authors conclude that a survey of the general population in search of gastric cancer is not work while but that studies of selected groups such st

persons with pernicous anemia should be expanded On the other hand the rigid selection of candidates excluded individuals with the slightest symptoms and thus the results in no way detract from the wew that even mild dyspepsis in older individuals de mands a prompt and adequate investigation.

DOUGLAS R. MORTON M D

Waugh J M and Fahlund T R.: Total Gastrectomy Surg Clin. A America, 1945 25 903

In 77 cases of total gastrectomy by the abdominal route performed at the Mayo Clinic from 1917 to 1943 inclusive, the over-ell surpical mortality rate was 44.2 per cent. The mortality rate for the 33 cases in which operation was performed between 1917 and 1939 inclusive was 6.65 per cent as compared with the mortality rate of 3.18 per cent for the 44 cases in which operation was performed between 1910 and 1943, inclusive. Gastrectomy was performed in 1943 in 30 cases with 5 deaths a mortality rate of 35 per cent.

Wangh and Fahlund attribute the remarkable reduction of surgical mortality in this series to the increased experience of the surgicous in dealing with the procedure improvements in postoperative care the use of chemotherapy and the early recognition and rigorous treatment of postoperative compiles

tions

More than half of the patients who survived the operation of total gustrectomy for cancer lived 2 or more years whereas 2 patients who underwent total gastrectomy for benign lesions have lived 6 and 8 years respectively and are still alive as far as can be accertained.

Isson, A. H. Intussusception in Adults. Surgery 1945 18 457

Statistical data appear to show that of all intususceptions, the incidence in adults is about 5 per cent. It is common medical experience that in infants there are, as a rule, no discoverable etioqual factors, while in adults there is usually an organic lealon a benign or malignant tumor as the basic cause. Other provocative influences are (t) typhold ulcers (2) tuberculous alcers, (3) dysentery (4) acute appendictis (5) Meckels diverticulum (6) a congenital fleat band (7) a submucous lipoma of the fleum (8) a foreign body (9) a sudden radical dietary change or (10) modplasma.

Enlarged lymphoid patches not infrequently cause intrasprection, and an instance in point appears to be the high incidence of the ileocecal variety with the presence of large Peyer's patches. The detrusor action of the terminal ileum and the greater size of the colon have been regarded as other probable

CRUSCS.

The majority of intussusceptions are of the enter occile variety and it is in the ileococal zone that considerable anatomic alteration in the size of the gut takes place.

Fraser proved that the innervation of the fleocecal zone is distinctive in that the nerve supply of the fleum is sympathetic and parasympathetic the cecum receives a supply of sympathetic nerves only. An explanation is thus found for the descending peristaltic irregularity.

Intussusception at times occurs during an attack of enterities and there is a strong probability that the swollen Peyer's patches may induce the hyper peristalsis.

Intussusception of the gastrointestinal tract may take place anywhere between the stomach and the rectum. The large bowel is the most frequent site of involvement in adults because beings and malignant growths particularly the former are more common there than in any other part of the gastrointestinal tract.

An intussusception usually forms a rather firm sausage-shaped swelling composed of three concentrically arranged tubes or layers—the afferent of ferent, and ensheathing. The first two form the intussusceptum and meet at the spex or most distal part of the invasionation the ensheathing layer constitutes the intussusceptions and joins the returning layer at the neck of the intussusception.

Intussusception may be single or compound. In the latter the primary invagination is surrounded by a secondary one which may in turn be surrounded

by a tertiary

Three forms of intussusception may be distinguished

I Enteric (10 to 15 per cent) in which the small intestine invaginates is prevalent in older children and adults. It is usually of organic causation. In the fleoileal variety only the small intestine is involved it may progress to become an ileolleccolic variety ordinarily discoverable in children.

2 Colic (5 to 10 per cent) in which the colon en sheaths (therefore, colocolic) This variety occurs in elderly persons. A not infrequent cause is a polypoid carcinoms or a benign polypoid growth.

3 Enterocolic (75 to 80 per cent) in which the ileum invaginates into the colon This is common in mants

When a gastroenterostomy has both an afferent and efferent jojunal loop the following three varieties of jejunogastric intussusception may on rare occasions occur as complications within a lev days or years after the anatomosis (i) the afferent loop solely may intussuscept into the stomach (a) the efferent loop may retrograde and stop short of or pass through the gastroenterostomy stoma and (3) the afferent and efferent loops may intussuscept into the stom ach

In adults the symptoms of intususception are not as prominent as in iniants. They are vague in most instances, with signs of mild recurrent obstructions associated with symptoms of the provoking cause. There are colleike abdominal pains, nauses, woniting, obstipation, and bloody stools. A mass in the abdomen is commonly not palpable in jejunal in tususception symptoms, usually intermittent may be present for months or years. There is always a history of upper abdominal pain, especially after

meals. Nausea and vomiting are common. Blood in the stools is not as common in jejunal intussusception. The abdomen is not distended early but be comes manifestly so as the obstruction progresses. On auscultation exaggerated peristaltic sounds may be heard until there is complete obstruction when one elicits the significant silent abdomen. A tumor mass may be felt, with or without anesthesia. It is sausage-shaped and lies transversely across and subjecent to the abdominal wall.

The diagnosis is mainly roentgenographic or sur gical.

If in a patient with a gastroenterostomy the afferent loop is intussuscepted the patient will as a rule complain of (1) postprandual epegastric pain with colicky exacerbations and (2) bilious vomiting The roentgenograms in most instances will reveal a distended afferent loop. The opaque meal will dem onstrate a rounded filling defect in the stomach (due to the intususception) upon which a relief pattern, the jejunal plicae, will be observable. If the efferent loop takes a retrograde intussusceptal course an acute high small bowel obstruction results with consequent colicky abdominal pain and the womit ing of gastric, then bilious, and finally intestinal contents. If the afferent and efferent loops intussuscept into the stomach, an acute, high obstruction obviously results.

The differential diagnoses in intussusception must be made from (1) Henoch a purpura (2) acute enter ocolitis, (1) simple colic, and (4) tuberculous mesen-

teric glands.

The barium enems and examination of the abdomen without opaque media are used to diagnose inturrusception In subscute and chronic intussusception in adults, it will be found that the com-

bined contrast meal and enema examination will prove most helpful in diagnosis.

Palliative treatment is justifiable only under the most exceptional circumstances. An early intussusception can sometimes be completely reduced with a pressure enema of water or air This method is dangerous and is better employed in infants and older children. In early cases a barium enema may be given at low pressure and an attempt should be made to reduce the mass under fluoroscopic control. This is often surprisingly successful in the colic or enterocolic varieties. It is almost impossible to reduce the enteric variety merely by rectal injection.

As a rule, an immediate surrical operation should be performed as soon as the diagnosis is made. Ether anesthesia is best avolded. Spinal anesthesia is preferred. A one-stage operation may be performed. When a bot pack fails to effect reduction an attempt should be made to insert a finger into the neck of the intumusception (between the entering and returning layers) and to sweep it around in this space the adhesions are thus broken down and reduction facilitated. If this maneuver proves ineffective a rubber covered forceps is placed in the neck as far as is safely possible and the blades are opened in several places. This procedure serves the dual purpose of

dilating the neck and of breaking down recent edhesions. If the aforementioned methods fall, the neck should be divided for an inch or more along the antimesentenc border with a pair of forceps. The incision is closed transversely to avoid narrowing of the lumen of the gut

If the large intestine is the intussusception site. graded operations are preferable. In some cases of irreducible uncomplicated intussusception a short circuiting operation may be performed. If the istestine is irreducible and gangrenous, one of the following expedients may be tried (1) resection, with end-to-end, side-to-side, or end to-side anastomosts, (s) Jesset a operation—removal solely of the invaginated part of the bowel through the encoupassing part of the intestine. After the inculor in the bowel is made, the invaginated part is with drawn in a downward direction as far as possible and cut away. Circular suturing closes the cut margin of the amputated, gangranous bowd. The exsheathing part of the bowel is then approximated and united by a through-and through continuous sutars whereon a Lembert stitch is placed. Finally a few interrupted sutures close the neck of the inter-

susception. The treatment of jejunogastric intususception is always surgical. If the afferent loop is involved reduction is affected by slight traction. A recurrence is prevented either by anchoring the afferent loop to the stomach or to the transverse mesocolon or by undoing the gastroenterostomy Sometimes gastrectomy in part, including resection of the ansitomoris, may be deemed advisable. If the effects loop is entangled reduction by traction may x found adequate, but in delayed cases, with gangrent, resection must be carried out. When both intestral loops are involved, reduction is by traction.

JOSEPH K. NARAT M.D.

Segal, H. L. Scott, W J M., and Watson, J 51 Massive Hemorrhage from the Small Intestine.

J Am 11 Att 945, 19 As a result of the analysis of the authors cases and of those reported in the literature the following suggestions are given to help differentiate massive gastrointestinal bemorrhage due to lesions of the jejanum and fleum from that due to gastroduodenal

ukcers s One should be aware that small intestical lesions may produce this syndrome.

# The pains present are not quite as typical # those of peptic ulcer

3 Hematemesia is usually not present. The gastrointestinal series is negative for

definite ulcer although it may be suggestive of duodenal irritability or pyloric spasm.

5 A roentgenological study should be made of

the small loop for retained barram. 6 A Levine tube passed during the episode of melena will not reveal gross blood. (This is door after the barium meal has ruled out a gastric or

esophageal lesion)

7 A gastric analysis may show low values for hydrochloric acid.

8 The presence of a palpable mass which slides away from the fingers may suggest a lesion of the small intestine

o Small intestinal lesions may be present in

addition to a peptic ulcer

The possibility of a small intestinal lesion should be considered in any patient who has repeated or continuous melena in the absence of bematement and in whom the pains seem somewhat stypical for peptic uleer. Such patients should have disgnostic studies even during the active phase to help determine whether the bleeding is from the common source peptic uleer or from the uncommon origin in the small intestine. Joseph Maloyer M.D.

## Shallow T. A. Eger S. A., and Carty J. B : Pri mary Malignant Disease of the Small Intestine Am J. Surg. 1945. 69, 172

Primary malignancy of the small bowel is a rare condition, which a difficult to diagnose early. The treatment of this condition requires extensive oper ative technique and results in a high operative mor talky and grave prognosis. Since this is a challenge to the modern surgeon, the author reviews 48 consecutive case of histologically proved small-bowel malignancy encountered in the Jefferson Medical College Hospital Philadelphia

Primary small intestine malignancy occurs in o.r. per cent of all autopsies while large-bowel malig nancies are 36 times as frequent. Three per cent of all intestinal carenomas and 60 per cent of all in testinal sarcomas occur in the small bowel Each division of the small bowel is involved equally by malignancies carennoma being twice as frequent as surcoma however the frequency in the ileum is lowest for carcinoma and highest for sarcoma. Eger reports that of 305 duodenal carcinomas 62 per cent involved the second portion 24 per cent the first, and 12 per cent the third, 2 per cent involved the entire duodenum Small-Intentine carcinolds com prise 0.02 per cent of the autopsy and surgical speci mens (8 3% of all small intestine neoplasms) They occur chiefly in the ilcum.

Small-intestine neoplasms are grossly classed in order of frequency as steposing infiltrating or ulcer ating and polypoid. Sarcomas extend toward the mesentery without producing obstruction or hemor rhage in contradistinction to carcinoma Carcinolds are small firm submucosal yellow nodules which rarely obstruct, but grow slowly and metastasize to theregional nodes in 25 per cent of the cases rarely to the liver Thirty-one of the 38 cases showed me tastases and extension to the regional nodes and liver In 5 of the 7 cases of duodenal carcanoms there were widespread metastases in I case there was regional node involvement and in a case there were no metastases. Of the 7 ampullary lesions 5 showed metastasis but in only r was the pancreas involved. Of the 24 jejunal and ileal malignancies 4 were without metastates 9 had regional involvement, and 11 had widespread metastases. No malignant cure noids were found.

The early diagnosis of primary malignancy of the small intestine depends on careful evaluation of the history and the physical laboratory and x ray find ings. The onset of symptoms was insidious in most of the cases although occasionally it was sudden with perforation severe hemorrhage or intestinal obstruction. The duration of symptoms varied from 5 days to 7 days and averaged 7 months Ampullars lesions produced biliary obstruction before intestinal obstruction, the occasional intermittency of the inundice being due to tumor slough increased intra biliary tension which forced bile through the point of obstruction or subsiduce of papillary edema Over 75% of the small intestine neoplasms were pai nable fixed if duodenal and mobile if jeinnal or ifeal Laboratory studies aid in diagnosis and guide the preoperative and postoperative management. Seven teen of so cases gave x-ray demonstration of the lesion. Comiting caused several examinations to be unsuccessful. Eight neoplasms failed to visualize on x ray even though the duration of symptoms aver aged 14 months. In spite of this x my study seems to offer the best and to diagnosis of these lesions at the present time

Decompression of the intestinal tract and maximum improvement medically are essential proper atively. This is accomplished by correcting any fluid and electrolyte imbalance anemia vitamin and plasma protein deficiency and imparted function of the heart, liver and kidneys. The type of operation depends on the patients condition the location and extent of the growth and the presence or absence of complications such as joundace or metastases. Ideal yearly and adequate resection of the growth and the adjacent mesentery with re-establishment of bowel continuity is the treatment of choice.

Various operations were carned out. One duodenal malignancy was resected. It was located in the third portion, and a side to-side duodenojeju noatomy was carried out, the second portion of the jojunum just distal to the ampulla being anastomosed to the jejunum 10 inches from the ligament of Treatz. The patient was alive and well 10 months later.

In the ampullary group the bile was redirected to the gastrointestinal tract in all cases. Resection was contemplated in a cases without metastases but the patients failed to survive the first stage. All the jejunal lesions were resected and end to-end anastomoses done. One case because of a contact card nomatous fistula required a resection of the terminal ileum with an end to-side anastomosis with the ascending colon This case was reported in some detail by the author and 314 months postoperatively showed normal x ray studies of the small intestine and colon. One patient with a sarcoma invading the transverse colon is alive 12 years later. This was resected and anastomosed primarily. Another pa tient with surcome of the jejunum died of metasta ses fifteen years after the primary operation. Six

ileal malignant tumors were resected and a tumor was exteriorized a which were considered nonresectable were treated with z ray therapy. Of the patients who underwent resection a with lymphosarcoma as who underwent resection is with lymphosarcoma as well 1 y years later and the a others who survived

meration could not be traced. These surgical results compare uniavorably with large intestine malignancies. Since these lessons are difficult to disense and metastasize early they are usually beyond the cural le state at operation. The sercomes have a better prognosis than caremomas The author believes that primary malienancy is most amenable to treatment if it is felunal and least amenable if duodenal. The author treated 27 of his 38 cases surgically with a 44 per cent operative mortainty Four of the patients are living and well, 12 7 and 4 years and 10 months respectively after operation. Four others lived 5 4 and 3 years, and r year respectively. Sixteen survived 6 months or less 3 were lost to follow up and 11 expired without surgery. The most common causes of death were

metastases and circulatory failure

Rosener R. Bronzow M.D.

Kiefer R. D. and Rose, J. R.: Chronic Heitle. J. 4m H. Arr. 945 20 94

On the basis of the experience reported here with the treatment of 100 cases of chronic ulcerative enternils conservative management is indicated in the catify acute forms of the duesax in mild cases of chronic uncomplicated terminal illusts and in ancomplicated segmental interitis with extensive involvement of the jelumum and illum.

is a general rule chronic terminal ilents is best treated surpically. This is in superment with the conclusions of Ginshing and Guicket. When the exteritis a complicated by obstruction, fatulas or abscesses surgical measures are definitely the treat ment of choice.

Although surgery is not successful in all cases, the resection of the inflamed loop of intestine produces a high percentage of satisfactor; results. Another point favoring surgical measures is the low operative mortality. Joseph Manorey M.D.

Gatewood, J. W. i. Solitary Disarticulities of the Cercury. Sun Surg. 945 52

The difficulty of differentiating scate appending preparation preparation in a cardiom at a president from the nural findings in the case of an inflared ratified directiculum makes a combleastess of this area of a prince in the case of a cardiomator of the cardiomator of the many cases at operation, radiod reservoir and or a presumptive diagnosis of cardiomators of the cardiomators o

for creal diverticulties. Two cases of solitary duer ticulties of the cerum occurring in young make an reported.

In thost cases of solltary diverticulate of the cecum, local excision is all that is required to effect , permanent cure. This is in contradistinction to multiple div riscubtis for which most treatment is pullative As pointed out by James very large inflamed diverticula lying close to the fleocral valve, or between the leaves of the measurers as a to icopardize the cecal blood supply require extensive resection. In the a cases reported one of the most dustinguishing features at operation was the normal condition of the howel surrounding the hfismed diverticulum, which made firm closure easy after local exession of the diverticulum. Associated appendectomy with local excusion of the diverticalum is justified and does not increase the rink aypreciably. In r of the cases microscopic examination of the appendix revealed a diffuse inflammatory process which might have caused trouble if it had been allowed to remain

Joun L. Lendour, M.D.

Dennia, C. Heostomy and Colectomy in Chronic Ulcarative Colitie. Surgery, pag. 5 415.

It has been found that with prompt and popularity aurgical management channel ulcerative radial and street death and the street of the street

During 16 recent months at the University of Minnesota Hospitali Minnespola, 23 cases of ulcerative couldly were observed to were given the benefit of surgery and of the 7 not undergoing open-

tion, a died a improved, and a failed to improve The author stresses the fact that extress the oughness and precision in every detail of the proporatil en operative and postoperative care as the important factors that have made surgery for choose discrative coulds a success at the University of Minnisota Hospitals. The procedures used in minimize the rate of surgery and to avoid the more complications that have made Beastony objective sales are received by described in fail detail.

Uter careful preoperative preparation floatomy the initial surgoni procedure and abouilt not be complicated by any other simultaneous procedure. A recthod of floatomy which minimizes the comparations of hernitation, freat fixtula and protages a described. With meticalous postopentive or

exconation and breakdown of the akin have been

negligible

The success of meticulous management of these patients is emphasized by the fact that in so cases there were a case of prolapse 2 cases of recession as cases of some trouble with skin exponsation no cases of salture of primary union no herolas and 2 deaths. The details occurred from patiennary embolus in one case and from involvement of the fleum jejunum, and stomach in the other. Colectomy is not done until from 4 to 6 months after the fleos tony and except in selected cases then only for encount of the cases of colities polyps or car canoma of the colon, profuse drainage or continued bleeding.

The rectum is spared in removing the colon and an improved method of closing the rectal atump is described. In some cases it was possible to re-establish the continuity of the bowel by deoproc tostomy many months after the fleostomy.

DAVID H. LTREE M.D.

Rubenstein, A. D. and Johnson B. B.: Salmonella Appendicitis. Am J. H. Sc. 1945, 210, 517

It is probable that a significant reservoir of salmonella infection exists among the general

population

The authors studied \$11 cases of salmonella infection 20 of these (approximatel) 25%) developed signs and symptoms of acute appendicities, and 18 came to operation. All of the cases in which the symptoms of appendicitis occurred were in children or young adults. The difficulty of the differential diagnosis in cases in which these maladies are associated is stressed.

Of the 18 cases which came to operation 11 showed no acute inflammation while 7 were found to have acute subscute, or rangerous appendicitis It is assumed that lymphoid hyperplasus of the small intestine appendix, or mesenteric nodes was responsible for the acute abdominal manifestations.

The authors suggest that an underlying salmonells unfection should be suspected in instances of mer plained persistent postappendectomy fever. They further point out that the recognition of the basic etiology in cases of salmonells appendiction will and me the prevention of secondary infections among contacts in the hospital and at home.

DAVID H. LYRIK M.D.

Hoerr S O: Mortality Factors in Acute Appendicitie. Surgery 1945 18 205

The failure of improvement in the mortality figures for patients with acute appendicitis at the Peter Bent Brigham Hospital, Boston Massachu setta, from 1915 through 1940 stimulated a detailed study of the 196 fatalities during this period. At tention was focused on the 80 operative cases in which death was directly attributable to progressing appendicults or its specufic complications.

Delay in operation was shown to be the major factor in fatal cases. Sixty-seven of the 80 patients

were operated on 48 hours or more after the initial symptom Fifty-eight patients were operated on within 6 hours after reaching the hospital but hospital delay of more than 6 hours occurred in 16 cases because of the uncertainty of the diagnosis. It is suggested that operation be performed promptly when the differential diagnosis lies between acute appendicitis and some other condition such as acute salpingitus in which operation is not definitely con traindicated. The consequences of delay are reflected in the fact that at the time of operation 53 patients had acute perforated appendicitis 14 had appendical abacess, and only 13 had acute unrup-tured appendicitis. There were only 6 fatalities in the cases of patients who were operated on within 30 hours of onset of the condition. Of these, 5 had perforated appendicitis. It must be noted that 40 of the 80 nations had definitely received cathartics.

Fifteen patients had undrained residual abscesses at the time of death. The author states that such abscesses abould be expecially sought for in cause not improving after a period of a weeks from the on set of the disease. Ten patients died of severe ileus or mechanical intestinal obstruction prompt preventive measures or timely operative intervention might have saved some of them. Three patients died despite adequate dosages with sulfonamides.

Statistics based upon the 80 cases give a slight advantage for the McBurney mution. Statistics, likewise, vinducate the trend in recent years toward closure without drainage, even in selected cases with perforation. Saxuru Kann May

Hurt L E The Surgical Management of Colon and Rectal Injuries in the Forward Areas. Ann Surg. 1945, 122–398.

Initial surgery of 30 injuries of the colon and rectum was performed by a general surgical team of an auxillary surgical group functioning with the Fifth Army in Italy Most of the infuries were caused by fragments. Twenty nine patients were operated upon within 12 hours of injury 5 within 6 hours. A short time interval can contribute toward an increased mortality because more of the severely wounded come to surgery The average time inter val was 15 hours The contribution of shock toward an increased mortality was exemplified by a deaths in spite of vigorous replacement therapy among 8 patients admitted in severe shock. The second part of the duodenum was injured in s of a cases of in jury of the hepatic flexure. Perstonesi contamina tion and early infection responded gratifyingly to forward surgery and its adjuncts sulfonamides and penicillin for only 12 patients exhibited objective signs of peritonitis Eight patients sustaining in juries of the colon or rectum slone were treated successfully Thuteen with colon injuries complicated by severe concomitant wounds died a mortal ity rate of 33 5 per cent. Severe shock, secondary to inluries of the colon complicated by concomitant wounds, was the dominant cause of death. Next to shock, sepsis was the leading cause of death

for bysous reasons primary suture of the un repared colon in the presence of pentoneal contamination has always been condemned in the au thor's theater Consequently all initial operations were designed to divert the fecal current outside the peritoneum. The only exception to this rule has been in those patients sustaining injury between the sig moid and the extraperitoneal rectum. These perforations were closed by suture and supplemented by proximal colostomy The type and severity of the injury occurring between the terminal ileum and sigmoid colon usually determined whether a loop or double-barrelled colostomy with spur was to be performed. Single or closely associated multiple anterior and lateral wall perforations and antimesenteric hemsections were exteriorized as loop colostomies. Mesenteric hemisections transections. and extensive injuries necessitating resection of the colon were exteriorized as a double-barrelled colostomy with spur in an endeavor to perform an initial operation that not only diverted the fecal current extraperitoneally but also left the patient with a simple stoms which could be closed secondarily without entrance into the peritoneal cavity Since the extra peritoneal closure of a loop colostomy of the right colon is impractical, a single perforation of the right colon was treated by tube colostomy or cecestomy

Injuries of the splenic flexure and left half of the transvence coin complicated by those of the left disphragm and left lung caused by a angle miseric, were operated upon translabarhagmatically. Some of the advantages of a thorace operative approach in thoracoabdonmal wounds on the left dide were excellent visualization of the wound tract casy removal of the frequently fragmented spiece mobilization of the splenic flexure under direct vision and ellimination of the separate collotomy incident, with its subsequent pain, which permitted the institution of an intenue cough routhes on necessary for the

postoperative intrapleural injury

Before closure of the daphragm the injured segment of the spicalic flexure or transverse colon was e teriorized either as a loop or double-barrelled clostomy with spur through a stab incision in the left upper quadrant of the abdomen. Likewise, if drainage of the abdomen was desired the drains were brought out through another but smaller stab incision of the left abdominal wall. On the other hand, injury of the hepatic flexure complicated by injuries of the liver, right disphragm, and right lung and caused by a single missile necessitated thoracotomy and a separate cellotomy incision as the liver offers complete obstruction to exploration of the right abdomen.

The Initial surgery of extraperitoneal perforations of the rectum consisted of thorough dibridement of the wound tract, suture of perforations, and sigmoid cleatomy. In addition, resection of the coorys and notation of the fascia propria were done to insure adequate drainage of the retroperitoneal, posterior and pararectal spaces. All sigmoid colestomies were of the loop type. However a recent personal com-

munication with surgeons in Base Hospitah has revealed that loop coisotomy for rectal injuries has failed in many instances, to divert competely he feeal current Consequently patients with reutinjunes have arraved at the Base from the Forsat Area Hospitale with feeally contaminated bettod wounds and the rectum filled with fees. In the future it is proposed to transect the signoid as prepare a spur at the time of initial operation of all extraperitional rectal injuries

Colcock has reported from a bospital m the Zos
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surgeons in this theater that adequate drainage on
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coccyx, incident of the facility profits, and opening of
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#### Croce E. J. The Management of War Injuries of the Extraperitoneal Rectum. A s. Surg. 945, 408.

Injuries of the rectum present many problems which are peculiar to it alone. These problems are largely from its physiological and anatomic properties. At the organ of temporary torage and eraction of the solid wasters of the intertunal tract, in contents term with organisms many of them potential pathogens both aerobic and anaerobic. As tomically it is for the most part unprotected by infection resisting peritoneum. It traverses a these which is highly vulnerable to mfection, and it is difficult of surgical access. In order to understand more fully the implications of the anatomic problems, the essential details of the relationships of the rectum are reviewed.

The clinical syndrome of retroperitoses lepsa we an inhitrant to the surgions of World War I. Druston reviewed the problem at the close of World War I. His suggestions as to treatment reveal list the problem at that time was still very much in the problem at that time was still very much in the problem control of the suggestion has proved entremely practical.

In extraperitoneal wounds of the rectum the only hope of ancess lies in very free local drainage carried out at the earliest possible moment. With a view to establishing efficient drainage he removed the uniqued cocycy in a cases, and in addition arrange for free drainage of the wounds of entry and crit. He found by stripping up the bowel that he was the to expose the wound in the rectum and was the canabled to drain and park of the surrounding part and prevent further tracking by retroperitoral bemorrhage.

During the past a years the authors were fortunate enough to administer definitive treatment to a molerate number of patients returning from the bulkfields in various stages of convalences from var wounds of the rectum, and in addition, were able to evaluate the treatment of many others who had not remained under their care. From these observations it was believed that progress has been made during this war in the management of extraperitoneal in junes of the rectum and that it warranted the crystallisation of surgical management. The part played by surgical prophylaxis in contrast to the supportive measures of blood plasma, and chemotherapeutic agents is emphasized. When the latter are applied alone without surgery they may influence the early mortality rate in assisting recovery from shock, but they do not appreciably after the morbidity or late mortality rate from chronic sepsis. These measures have been proved to be merely adjuvants and not in any way substitutes for early and properly executed surgerv

The following conclusions as a result of observa

tions have been reached

1 Perforation of the infraperitoneal portion of the rectum results in fecal contamination of the cellular tissue of the infraperitoneal space. This space communicates with the retroperitoneal space posterorit over the sacrum and this may result in fulminating and widespread sepsis behind the pertioneum

2 Even when the perforation cannot be located but there is presumptive evidence of its presence or potential development from contusion or infact of the rectum as judged from the course of the musile and the presence of a large hematoma in the infra peritoneal space, an effective sigmoid colosiomy.

should be established at once

3. A sigmoid colostomy alone will not prevent in fection of the infraperitoneal space although the infection is likely to be less widespread and fulma nating after contact with the normal intraluminal pressure is severed and gross contamination of the sormally functioning bowel is avoided. In addition, the infraperitoneal perirectal space must be asucer ised by cocypectomy and loosely packed.

4 Mere saucerisation of the perrectal space while life-saving and prophylactic against spreading retropentioneal sepsis is not however complete ideal treatment. Unless the perforation is located and closed a persistent fistula may develop

JOHN E. KIRKPATRICE, MLD

Dixon, C. F and Benson, R. E. Carcinoma of the Sigmoid and Rectosigmoid Involving the Uri nary Bladder Sugary 1945 18 191

At present curenoms of the sigmoid and rectosigmoid with datant metastass is amenable only to pallative treatment. However when local extension of the decesse only is present the condition a seldom inoperable. It therefore seemed advasable to the authors to point out some of the problems associated with curcionoms of the sigmoid and rectoasymoid in volving the urinary bladder and to review their experiences with its surgical management. This study is based on 64 consecutive cases in which operation was performed by the sensor author in the years 1931 to 1943 metastre. A small amount of accordary invasion of the unnary bladder by carcinoma of the signoid or rectosignoid may give rue to no clinical or laboratory finding. More extensive involvement often produces distressing unnary symptoms and pyoria

Of the 64 patients in the present series, 50 were males and 5 were females. The apparent infrequency of involvement of the urmany bladder in this condition in the female in comparison with the male is evidently attributable to anatomic differences in the pelvis. The ages of the 64 patients varied from 30 to 76 years the average age being 55 years. In the majority of cases carcinoms had been present for a long time, and it is therefore not surprising that many patients were in poor general condition.

Probably the first step in invasion of the urinary bladder by carcinoma of the sigmoid or rectosigmoid is an inflammatory attachment of the tumor to the peritoneal covering of the bladder. This nituation sometimes is encountered at operation. In such a case the malignant process can be desected from the urnary bladder without an opening into its lumen. The examination of small bits of tissue from the vesical wall at the site of attachment will reveal the presence or absence of residual caremoma and will allay any doubt in the surgeon a mind as to whether the malignant process has been completely eradi cated. The inflammatory reaction around a sec ondary malignant growth of the bladder is a phe nomenon not only of the early stages but also of the later stages of the malignant disease. Often advanced carcinoma that has extensively infiltrated the wall of the bladder is surrounded by such a severe inflammatory reaction that it is difficult to deter mine even at operation when the lesion is in full view and can be examined by the nalogating hand whether the reaction is primarily inflammatory or neoplastic.

When a large carcinoma in the sigmoid or rectosugmoid has extended to the urinary bladder and is surrounded by an indurated inflammatory reaction the surgeon may be tempted to perform colostomy and to wait several weeks for the inflammation to subside before undertaking resection of the bowel Undoubtedly this is often a valuable procedure but the senior author recently has concluded that post ponement of resection after the distal segment of colon has been defunctionalized will not as a rule appreciably diminish the inflammatory reaction if the malignant growth has penetrated completely through the wall of the bladder. In such instances the urine and the diseased condition of the bladder continue to feed the infection in spite of the use of urmary antiseptics. Therefore it has become the senior author's practice to resect such lesions pri marily whenever the general condition of the patient warrants the procedure

In 4s of the 6a cases in this series the condition was classified as operable. Two patients in the group who presumably had removable lessons died after colostomy. In the remaining 40 cases resections were performed. In 19 of the 40 cases the

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Jone E. Krizerance, Ell.

#### Croce, E. J: The Management of War Injuried the Extraperitoneal Rectum. Ann. Sur. 1945 408.

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A small amount of secondary invasion of the unnary bladder by carcinoma of the sigmoid or rectosigmoid may give rise to no clinical or laboratory finding. More extensive involvement often produces datressing urinary symptoms and oyum-

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Probably the first step in invasion of the unnary bladder by executoms of the surmoid or rectosismoid is an inflammatory attachment of the tumor to the pentoneal covering of the bladder. This situation sometimes is encountered at operation. In such a case the malignant process can be dissected from the urinary bladder without an opening into its lumen. The examination of small bits of tissue from the vesical wall at the site of attachment will reveal the presence or absence of residual carcinoma and will allay any doubt in the surgeon s mind as to whether the malignant process has been completely eradi cated. The inflammatory reaction around a sec ondary malignant growth of the bladder is a phe nomenon not only of the early stages but also of the later stages of the malignant disease. Often ad vanced carcinoma that has extensively infiltrated the wall of the bladder is surrounded by such a severe inflammatory reaction that it is difficult to deter mine even at operation when the lesion is in full view and can be examined by the palpating hand whether the reaction is primarily inflammatory or neoplastic.

When a large carcinoma in the sigmoid or rectosugmoid has extended to the urmany bladder and is surrounded by an indurated inflammatory reaction, the surgeon may be tempted to perform colostomy and to wait several weeks for the inflammation to subarde before undertaking resection of the bowel Undoubtedly this is often a valuable procedure but the senior author recently has concluded that post ponement of resection after the distal segment of colon has been defunctionalised will not as a rulappreciably diminish the inflammatory reaction if the malignant growth has penetrated completely through the wall of the bladder. In such instances the urine and the diseased condition of the bladder continue to feed the infection in spate of the use of urinary antiseptics. Therefore it has become the senior author's practice to resect such fesions primarily whenever the general condition of the patient warrants the procedure

In 4x of the 6x cases in this series the condition was classified as operable. Two patients in the group who presumably had removable lesions died after colostomy. In the remaining 40 cases resections were performed. In 19 of the 40 cases the attachment to the bladder was of an inflammatory nature and removal of the tumor did not necessitate an opening into the humen of the bladder. In the remaining a cases portions of the full thickness of the vesical wall were removed. In 15 of these approximately a third or more of the origin was resected. In most of the cases resection of the bowle was completed by end to-end anastomoris. There were 7 operative dottle. The original the time of follow-up or for more than five years after resection.

#### Hayden E. P: The Surgical Treatment of Car cinoma of the Rectum. Y Expland J II 1945 233 8

Statistics on 198 cases of resection for carcinoms of the rectum are presented. In the presence of one or two metastases in the liver, or when the local growth, although extensive and perhaps abscessed, could still be removed, operation was completed in order to give relef if not cure, in this unfavorable group of patients Of 117 patients emplored only 19 presented a carcanoma so extensive that a radical procedure would have been foolbardy One-stage abdominopernual resection was performed in 131 cases. The other procedures carried out, in order of decreasing frequency were two-stage abdominoperineal resection, anterior resection Milmiles resection, end to-end suture and tube resection.

A stay of from 3 to 5 days in the hospital before operation on the colon was usually an adequate period for general rest, preparation of the bowel, completion of laboratory work, and whatever measures seemed necessary to improve the patient as an operative risk. Unless contraindicated, ponto-calne spinal anesthesis, which greatly facilitates the case of operation, was used. The colostomy was opened in 1 or 3 days and an enems given on the fourth or fifth day borfe trigations of the posterior wound were begun after removal of the posterior wound were begun after removal of the posterior beck and continued until the discharge exceed The average postoperative hospital stay of these patients was 5 weeks.

In the entire series there were 16 hospital deaths a mortality of 13 per cent. The chief causes of death were pneumonia sepsis embolus and obstruction. Although over 50 per cent of the deaths occurred following one-stage resection, this should not be considered an indictment of the procedure, since actually, the number of deaths (14) was only 10 per cent of the number of single-stage resections (131), a mortality lower than that of the series as a whole Of the 108 patients undergoing resection, 75 died later in most cases of recurrent disease 12 of them died of unrelated causes and of are still alive. Of the of patients operated on over 5 years ago 32 or 33 per cent, have survived without evidence of disease for from 5 to 14 years The longest interval before death occurred from recurrent disease was 5 years and 5 months after operation.

John L Lyddonat M.D

Mandi, F : The Technique and Results of the Primary and Secondary Pull Through Operations after Removal of Tumors of the Rectum and Rectosigmoid Surgery 945, 181 314.

Since the restoration of continence is of prine importance after the renoval of timors of the rectum and rectosigmoid any radical operation which does not permit this possibility is regarded a imperfect. The techniques of the primary (Ricch negg) and the secondary (Weil) pull-through medicals are described, the latter is accomplished by the sartificial production of prolapse (Mandl) from the sacral amus and operation on the sacral hemis. The pull-through procedure may be used equally as well after ascral or abdominosacral radical operation. The method of Hochneega holds the greatest prosite of success for the restoration of continence after operations on the rectorigmoid.

Colostomy should precede the pull-through operation. Details are described. Samuel Kanz, M.D.

## LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Ruffin, J. M., and Wise, B.: The Value of Plasma Vitamin-A Determinations in the Differential Diagnosis of Jaundics. A Preliminary Report. Gentreatersley, 045 4-466.

It has been shown repeatedly that the plaims level of viramin As its low in fiver disease. This is to be a pected since it is generally suggest that canotack be converted by the liver nine viramin A. Therdor, the authors present the hypothesis that if jumdich due to common duct obstruction without live length one would expect a normal viramin A level in the plasma whereas jumdice from a diffuse hepating should be accompanied by a low level of viramin A in the plasma.

in the passma.

In every patient in the authors series who we classified clinically as having acute hepatitis or of actrala jaundies 'there was a significant lowering of the plasma vitamin A. Since a gradual is the hose leavest of the plasma witamin A. Since a gradual is the hose leavest of the control of the passage of the vitamin A. I even and other tests of they function except the cephalin foocculation test, which was pontive in every case.

Of the o patients who were found at operation to have obstruction to the common duct, 6 had no demonstrable evidence of liver involvement and had demonstrable evidence of liver involvement and had vitamin A levels which were either within or close to normal limits. The levels were definitely lowered is the remaining a patients but in each case either the duration of the disease or obvious infection were factors which could readily have resulted in liver dassage. Thus it would seem that a patient with common duct obstruction of short duration, without richence of liver involvement, probably will have a nor mal vitamin A level whereas if the obstruction has been prolonged, or if there is evidence. This irv they infection or metastases t the liver the vitamin A

level may be reduced. On the other hand patients having a diffuse hepatitis invariably will have a definite lowering of their plasma vitamin A, and if may well be that this procedure will afford valuable evidence in distinguishing between these two forms of laundice.

FARLO LATRICK M.D.

Eddy, J. H. Jr : Methionine in the Treatment of Toxic Repatitle. Am J. H. Sc. 1945, 210, 374

Miller and Whipple have shown that there is in creased sensitivity of the liver to toxins following protein depletion in dogs exposed to chloroform Goldschmidt Vara and Ravdin, in their work on niee pointed out the protective action of protein deta Carbohydrate as a liver protector is generally accepted and Miller and Whipple believe that its efficiency is primarily due to its sparing the protein stores.

Lately interest has centered on the identification of the specific protein factor responsible for liver protection. Miller Ross and Whipple in 1040 showed that methonine and to a less extent evalue would protect the liver against injury if given before chloroform anesthesis - this protection was comparable to the feeding of a large protein meal. In 1942 they showed this same protection occurred even when the methionine was given 3 or 4 hours after chloroform anesthesia but 6 hours after anesthesis no protection occurred presumably because all of the cells had been fatally damaged. Therefore for methionine to be of any value some viable liver timue must be present. Clinically then early treat ment is emential if methionine is to be effective Choline alone has been shown to be useless as a protection arent but combined with cystine it rivals methionine Goodell, Hanson, and Hawkins in 1944 poleoned dogs with maphamen and demon strated the effectiveness of methionine against this beputotoxin

It is believed by many that methionine protects the liver from damage primarily because of its suffur content since protein-depleted dogs are more completely depleted of sulfur Heppel of all showed that there was decreased resistance among protein-depleted animals to dichlorethane but if they were ied methionine and choline there was increased resistance to its toxic action. These dogs showed no evidence of hepstic lessons and this suggested that the protective effect of methionine may not be dependent on the liver alone. To support this theory like authors showed adrenal changes in some of their animals.

Gyorgy in road stimulated clinical interest in methionine. He outlined the progression of changes in animal livers on a protein deficient due from fatty infiltration through necrosis to cirrhosis. He pointed out the presence of cerold in the errhosic livers produced by dietary means a product not seen in other forms of animal or human cirrhosis. He compares the kidney lesions simultaneously seen in cases of damaged livers on a dietary basis with the socalled bepatorenal syndrome in man Gyorgy aug getted that choline and cystine are needed for the synthesis of another substance that may be methic nine. He recommends its use in the prevention and treatment of hepatic injury due to purely toxic as well as dretary factors.

The author in reporting cases of carbon tetrachloride poisoning noted that the severest cases all occurred in negro women with high fat and protein deficient diets. White women with the same job and adequate detts showed only mild toxic symptoms. A case report by Beattle et al. of treating carbontetrachloride poisoning with methionine stimulated the author's study of its use in the treatment of hepatitis due to trinitrotolueze and later other types of hepatitis and cirrbosis.

Since July, 1944 the author has treated 30 cases of acute toxic hepatitis with methionine. Most of them were due to TNT and at least 10 patients were seriously ill. To date, there have been no fatalities as compared with the published mortality of from 30 to 35 per cent in TNT hepatitis. Prior to the use of methionine the author treated 2 patients with TNT hepatitis 10 whom died and the other has a prolonged illness. Many patients seen since then have appeared to be as severely, poisoned as these first cases on admission.

The average length of hospitalisation of the cases treated with methionine varied from 4 days to 7 weeks and averaged 13 days. The diagnosis was based on an analysis of the occupational exposure physical examination scienc index and Hanger cephalin flocculation test and urinalysis for urobilinoren and bilirubin. The daily urinalysis for urobilinogen and bilirubin is of value in following the patient a course A decrease in the bile in the urine and an increase in urobilinogen is closely followed by a decrease in the icteric index. Below to this decrease is alow and often a value of from 10 to 12 persuts for several months. The Hanger test never gives a false nega trye, and false positives are rare. The author does not believe that a reading of + or ++ is significant. This reading also returns to normal slowly and may not be negative for one or two months

Almost all patients complained of dissiness nau sea vomiting weakness, and pain in the right upper quadrant. On physical examination they showed jaundice and palpable enlarged livers. There has been a preponderance of white males with this condition although both colors and seres are affected.

Treatment included bed rest a high protein and carbohydrate deet and a low fat diet multiple vita min products, additional B complex vitamins and the oral administration of methionine in doses of from 3 to 8 gm daily. The average dose was from 3 to 4 gm in a day but in 2 cases with more jaundice the dose was increased to 8 gm daily and the patients were fed with a duodenal tube. Both cases improved markedly after 48 borns.

The author then presents abstracts of 3 of the more severe cases of T.N.T. toxic bepatitis. Two of these cases showed such remarkable improvement after the dose was increased that the author believed

the usual dose of methonine might be inadequate and that from 6 to 8 gm. daily should be given to all sensously ill patients. The author gave 10 gm, a day to 1 sensously ill patient without evidence of toxirections. The usual course is to start the patient on smaller doses and increase the amount if clinical improvement it not soon apparent.

Several cases of acute carbon tetrachloride hepetities as well as a cases of epidemic hepathtis all of which were treated with methodolee, were improved. The treatment of some cases of cirrhoats of the liver has been started, but co clusious cannot be drawn from the few cases in which treatment has been completed. It is apparent, however, that methodolee or choline plus cyatine will be of value in early cirrhoats and in controlling episodes of acute activity in older cases. Little help can be given to the far advanced cases as the functional unit has been irreparably embarrassed by the laving down of sent tissue.

ROBERT R. BRIZZOW M.D

Blumberg, N., and Zisserman, L.: Acute Support attre and Gangrenous Cholecystitis. Apr. J Surg. 945, 70, 38

Much has been written about acute cholecystites Experimental work suggests that the pathology is usually a mechanical obstruction of the cyttic duct with edema and ischemia of the wall, followed by secondary infection. The question of immediate or delayed surgery in acute cholecystits has long been controversial. Each policy has some disadvantages the former commits the surgeon to operate in a septic edematous field and the latter submits the patient to the dangers of a leaion that may be progressive. Acute cholecystitis can resolve itself spontaneously without surgical interference or it may progress and terminate in gangrene or empyema. The authors present this article as a study of ad vanced call bladder disease-empyema and/or can grene with or without perforation.

A series of 8s cases were examined in the period from 1003 to 1044 at the Philadelphia jewish Hos pital. Thirty (37%) of these cases were makes averaging 33 3 years of age. The 3s females averaged 55 9 years and the ages of all ranged from 50 to 72. The authors compare these figures with those in other reports published in the Iterature.

Fifty four patients (66%) gave a history of symptoms referable to the biliary trac prior to the present attack, and only 6 definitely denied such symptoms. Many gave a history of gall bladder disease attacking over a great many years.

disease extending over a great many years. The interval between the oract of the present attack of pain and its termination by operation or antecedient demine averaged 1s days for the men and 3½ days for the women. At this bospital, it was the policy to operate on acute cases only if it was deemed necessary because of a progressive lesion, and to wait for subsidence of the acute symptoms whenever feasible.

Abdominal pain in this series originated (1) in the right upper quadrant, ( ) in the epigastrium, or (3)

as generalized abdomnal pain. Fifty per cent of the petiton's reported radiation usually to the backgright shoulder or across the abdomen. Abdomal distention was not often noted but marked tender notes localized to the right upper quadrant, as usually pretent. Nine patients reported a hatory of chilis and fever with the present attack, and nauses womting or both were present in most one. Only to specifically dealed either of these graptoms. No consistent change in bowd habits us noted Jaundice appeared in only to per cent of the patients during the present attack and only if per cent had a history of previous jaundices.

An enlarged mass in the upper right quadrant is definitely palpable on admission in 36 cases (6.5%). There was definitely none palpable in 35. The properative temperature was usually a sustained deviation sometimes as high as 100 degrees and other times barely elevated. A moderate temperature averaging about 101 degrees was usual. Blood pressure readings on admission varied widely but rearged 134/10 for men and 144/86 for women

The average white blood count on admission us 15 600 cells per cubic millimeter for men and 15,5% for women (8 3% and 80.3%, respectively, we neutrophils). A great many of the patients bear a fall in the white blood count prior to operates, the males averaging 14,000 with 80 oper cent neutrophils and the females 13,900 with 76.3 per cent neutrophils a day or so preoperatively. Since these cases were progressive with probably nonresiding lealons this did not lodicate an improvement in the pubbolicy of process. The red cell counts were geln normal in most cases with the exception of some concentration due to delaydration.

Fasting blood sugar testowere made a 4 patients 13 of whom were known distertio. Levik cas than 100 mgm, per cent were obtained in cases (50% of the nondiabetic group). Mineres (17% of the nondiabetic) had levids between on and 150. The remaining 13 nondiabetics had levik above 150 4 over 150. The somewhat clevilly blood sugar levels were attributed to concentration to contain the contain cornary occlusion, intravenous glucose themy shortly before the test, and unrecognized dishere mellitus. The authors believe three was nothing to suggest any tendency to produce an elevited faulty blood sugar as is known to occur in acute comery occlusion. Blood ures nitrogen determinations of cases were within normal lumbs in most cases.

An attempt to correlate the sevenity of the disease with clinical and laboratory data was considered admirable so the records of z cases of perfound gall bladders were studied separately These case represented as per cent f the entire group. They were not necessarily all recent perforations, some being well encapsulated by adhesions of omentes, and nivy swere associated with widespread pertonitis. Rupture into the duodenum occurred is case.

The ages of the 9 men patients averaged 61.8 years and those of the 12 women 57 I years, and nearly all

of the patients had an antecedent gall bladder history. Only 3 denied any prior bihary dysfunction. The average duration of the recent acute attack was 11 days for the females and 8 days for the males. The acuteness of the average perforated case was noted and eather interference practiced 8 cases being operated within 7 days of the acute onset and 5 within 3 days. One third of this group had a pall pable mass in the gall bladder region on admission to the hospital.

to the respital. The pain of onset was diversified and more wide spread and the right upper quadrant pain and ten demess were more severe and more often present than in the general group. Two-thirds of the patients had extreme tendemess, abdominal rigidity naused and woulting. The remaining one third consisted of cases in which the perforation was long standing with localized chronic abacers formation. These had very little tendemess or rigidity.

In the perforated group the admission white count averaged 16 600 with 82 per cent neutrophils. Three

cases had counts in excess of 26 000

Surgery of the gall bladder was performed in 73 cases (85% of the entire series). The operation wanted from simple incurson and drainage to complete excision according to the seriousness of the cases the approximately one half of the operative cases tholecystectomy was done. In the perforated group only 3 had cholecystectomics while 14 were treated by simple incision and drainage.

Spinal anesthesas was used in 50 (81%) of the operations. Supplementary anesthesia of nitrous oxide oxygen, ether or pentothal was used in 7 cases. Anne were done under local and 5 under general anesthesia and 14 of the perforated group were done under spinal and 5 under local anesthesia.

Stones were found in 63 patients (70%) In x1 cases they could not be definitely ascertained Six cases definitely had none. Two-thirds of the per forated group had stones and only x definitely did not. The examination was not complete in the remainder

Of the entire group of 8s patients, so died during their hospital stay. This group averaged 60 5 years of age. Of the 33 operative patients 11 died port operatively a mortality of 15 1 per cent. Twelve of these patients died as a direct result of biliary discuse, and 4 of causes uninfluenced by and unrelated

to biliary disease

In spite of the leasened trauma attending gall bladder incisions the mortality for this procedure was more than twice as much as for excision. For the most part the patients were poorer risks. In the mortality group the average interval between the onset of the attack and its termination by operation or prior demise was 10 5 days. The white count average 16,300 with \$1.8 per cent of neutrophilis.

There were 13 diabetic patients in the series (15,0% of the total) which correlates with the idea that diabetics have twice the tendency to develop patients taken. The average age was 61 a years and 5 of these patients were males. One half were operated on within a week, and o had palpable gall bladders preoperatively. The average white count was 15 200 with 81 per cent of neutrophils. Three cases per forated an incidence of 25 per cent. All these facts show a similarity between diabetic and nondiabetic cases. Eleven diabetics (85%) were operated on and to had gall stones. Two cholecystostomes and 3 cholecystectomies were done under spinal anesthesia. Seven diabetics (54% of the diabetics) dred these deaths made up 35% of the total mortality All of these deaths were due directly or indirectly to billary disease.

The presence of gall stones in cases of acute chole cystitis in a far greater incidence than chaine alone suggests points to a common etiology or to the fact that stones may play some role in the acute process. Since most patients have been suffering more or less from chronic gall bladder duease before developing an acute and dangerous condition, it may be wise to consider the prophylactic approach to the problem i.e. the desarability of removing the gall bladder in all symptomatic cases of chronic cholelithiasis as a curative for symptoms and a preventive of complications. Certainly every case of acute cholecystilis that is allowed to subside should be operated on after a reasonable interval to preclude future more serious attacks.

The authors believe that the seventy of gall blad der disease depends directly upon the chromety of a gall bladder condition. The diminished vascularity with increasing age and the fibrous accompanying attacks may izvor widespread serious damage with sudden vascular occlusion.

It is recognized that it is not possible to correlate the severity of the signs and symptoms with the degree of disease present in any given patient.

Although there is a marked tendency for diabetics to form stones, there is no unusual tendency for the diseased gall bladders in these cases to progress to suppuration or gaugene. The exceptionally higher mortality in these cases suggests that tissue destruction in the gall bladder is tolerated as poorly as elsewhere. Diabetic patients should not only be coundered poorer risks for surgery in advanced gall bladder disease, but probably deserve more probably acts surgery. Robert R Broxnow M.D.

Otler G F., and Dow R. S: Variations and Anomalies of the Biliary Duct System and Its Associated Blood Supply West J Su g., 1945 33 310

Dissection was carried out on 30 calavers to show variations in the extrahepatic billiary duct system and cystic arter. The cystic and hepstic ducts may join at an acute angle (Fig. 2) or follow a long straight or spiral fortrous course (Figs. 2 and 3) Accessory hepstic ducts were found m 6 of the 30 Accessory hepstic ducts were found m 6 of the 30 Accessory They may unito with the gall bladder with the cystic duct (Fig. 5) with the common hepstic duct or come into the angle at the junction of the cystic and common hepstic ducts (Fig. 6) Frequent variations

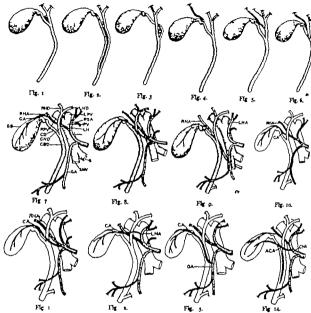


Fig. to 4 Variations in the extrahepatic billiary duct system and cystic artery ACA, accessory cystic artery Ch, cystic artery CBD common bile duct; CD cystic duct, CHD common hepatic duct, GA, gastroducidensi artery GB, gall bindder HA, hepatic artery LHA, left

occur in the common bepatic, and right and I ft hepatic arteries.

The cystic artery a very mportant ne surgically showed a good deal of variation. It may be normal ite, arise from the right hepsite to the right of the common bepatic duet (Fig. 7) but may originate behind (Fig. 10) or to the left of the duct. It may come from the left hepsite artery (Fig. 12) of from the gastroduodenal artery (Fig. 13). Accessory crystic arteres are rare, One was found ariting from

bepatic artery' LHD left bepatic duct; LFV left brank of portal vela, PV portal vela, RGA, right gastic arter, RHA, right hepatic artery; RHD, right bepatic larter, RFV right branch of portal vela SHV superior seemteric vela and SV solvelic vela.

the hepatic artery (Fig. 14) another from the left

hepatic artery
The amount of variability in the extrahepatic doctyatem and its associated blood supply makes it of
the utmost importance that the surgeon scent
actisactory visualization of these structures at the

time of surgery

The 14 figures here included show the various findings of this study

RICHARD J BERNETT JE, M.D.

Van Gelderen G. Transpapillary Duodenal Drain age of Hepatic Duct (Die transpapillaere duodenale Hepatikundraenage) icts chir scand 1934, 09 27

Insertion of a T tube into the common duct is frength with the danger of a secondary controlal stenoids the drainage leads to a considerable loss of fishes and ions and in addition, the absence of bile in the intestines interferes with the recorption of fats. Moreover the loss of andigested fats impairs the absorption of proteins and calcum Finally a deficiency of the fat-soluble vitamins A D and knay be the secuel of the external drainage of bile

For all these reasons it has been suggested that external drainage of the common duct be replaced to choledochoduodenostomy. However such anastomosas facilitates the development of sacending cholangitis capecially because the new stoma is depirted of a sphiniter. Therefore this procedure should be employed only if the papilla cannot be stretched and if one suspects small stones in the hentite duct.

A permary closure of the common duet is not advisable in the presence of acute cholangits as a rule. The primary closure is certainly contraind; cated if an induration of the head of the pencreas compresses the outlet of the common duet. In such instances an internal drainage of bile is desirable A rubber drain buried in the common duet is not always expelled through the duodenum and may be responsible for a recurrent cholangitis or formation

To obvante these drawbacks Voelcker introduced a drain through the common duct into the duodenum and exposed the tip through a transduodenal incision, the drain was pulled through the opening in the duodenum and exercised to the outside through a Witzels fatula. The drain could be removed within a few days without leskage of the bid or duodenal as few days without leskage of the bid or duodenal

of stone.

The author modified Voelcker's procedure in the following manner bougles are introduced through a choledochotomy to dilate the papilla and a rubber drain is carried from the common duct into the duodenum through the papilla. An incision is made in the duodenal wall over the protruding tip of the dram and a lateral opening is made in the tubing to establish an internal duodenal bile drainage drain is pulled and carried through a Witzel's fatula The incision in the common duct is closed with cat gut and the gall bladder is removed. The drain is brought out through a stab wound in the abdominal wall and clamped with a hemostat. Approximately one week after the operation the drain can be re moved. In this manner acute cholangitis is successfully combated without external bile drainage. The icterus does not disappear as promptly as after ex ternal drainage but, on the other hand, dehydration is avoided and the general condition of the patient improves rapidly

Only the part of the drain directed from the lateral opening in the duodenal portion toward the liver

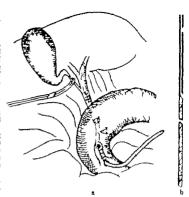


Fig. 1 a, Diagram of procedure b Special drain short ened by interruption.

must be hollow while the remaining portion of the drain may be solid which avoids the necessity of a clamp

The drain may be used not only in infected cases accompanied by high temperature but also in all cases in which a primary suture of the common duct does not appear dependable. The method is apply table also in patients with a chronic inflammatory induration of the head of the pancress in whom it may replace a. T tube or a permanent anisomous. The author's drain may be employed also in reconstruction of the billiary ducts and after choledochody. Torser K. Nakar MD.

Peterson, L. W. and Cole, W. H.: Chronic Scierosing Pancreatitis Causing Complete Stanosis of the Common Bile Duct. Arch. Surg., 1045
51 15

Peterson and Cole wish to call attention particularly to the type of chronic pancreatitis associated with diffuse atrophy and fibrosis throughout the entire gland. Such a process may produce surprisingly little physiological or mechanical disturbance. However faundice may develop and become permahent because of the severity of the sclerosing process involving the common duct

While this condition is not common, the seriousness of destruction of the terminal end of the common duct by the progressive pancestitis is sufficiently well appreciated that every effort should be made to treat acute pancreatitis early, and climinate it if possible. The ethological factor in the production of the usual type of acute edematous pancreatitisar pears to bestrongly related to holelithisms the

fact that in some cases the pencreatitis subsides after cholecystectomy is suggestive proof of this relationship but it is by no means conclusive, since not infrequently cholecystectomy falls to stop the pancreatits. Occasionally it develops after choecystectomy

Localized pancreatitis in the head of the pancreas, simulating carcinoma, is rather commonly observed by surgrous. The process which fre quently produces complete obstruction of the common duct, usually subsides so completely within a few weeks or months that all symptoms disappear The surgeon too often attributes the entire success of relief of obstruction to the short-circuiting opera

tion, i.e., cholecystenterostomy

Complete permanent obstruction of the common duct due to chronic pencreatitis is a difficult lesion to treat, but presents much less difficulty than bstruction due to complete sharace or destruction of the common duct, because the remnant of the common duct simplifies the operative procedures. When the obstruction is due to localized pancreatitis in volving only the head of the pancreas the prognosis for spontaneous complete recovery appears to be much better than when a generalized chronic sclerosing penerentitis is producing a complete obstruction of more than transient type. Therefore, the customary operation of cholecystenterostomy for local pancreatitie in the head of the pancress appears to be a logical procedure, particularly since the anastomosis will frequently remain open for only a few months at the end of which time the patcreatitis usually subsides completely with relief of the obstruction. The operation of cholecysten terostomy has one serious duadvantage namely the resulting development of cholecystatis and hepata th which has been shown experimentally by Wan gensteen and others

It is extremely difficult to differentiate chronic puncreatitis localized to the head of the puncreas and producing temporary complete obstruction of the common bile duct from carcinoms of the head of the pancreas without a deep biopsy from the lesion. In the even more rare type of diffuse chronic scierosing type of pancrestitis operative therapy must be directed at establishing a permanent nonstenoung communication between the suprapanceatic por tion of the common bile duct and the intestinal tract. In addition, the regurgitation of food and intestinal secretions must be prevented as much as possible.

Of the several operative procedures that have been described, each has some individual merit. The procedure of choice would be an assetomesia of the proximal stump of the common duct to the duodenum or an anastomosis of the proximal end of the common bile duct to the blind end of a single arm of jejunum utilizing the Rouz principle. Into this blind loop of jejunum, through which food does not ordinarily pass, valves, as previously described, are placed to help prevent regorgitation of food side to side ansatomous has the added advantage of

allowing function of the terminal duct to be resumed if the pancreatic lesion should clear sufficiently to allow relief of the obstruction. If the terminal end of the duct is hopelessly destroyed, the duct may be mobilised and either a transplantation into the duodenum or an anastomosis performed. If the latter procedure is used, a vitalitum tube may or may not be used, according to the size of the common duct. BENTANIN GOLDBAN, M.D.

Mansiner S. R. and Bundy H. K.: Islet Call Tumore of the Pancross. Sergery 945, 12.171. The relationship of inlet-cell tumors of the puscress to hypoglycenia is now well recognized and

there have been an increasing number of such cases reported up the literature of the last decade. In Whipple's recent review on 140 cases of hist-cell tumor showing hypoglycemia there were 100 which were considered benign, 18 questionably malignant and 15 definitely malignant with metastages to the liver

The tumors may be single but two or more have been found in approximately to per cent of the reported cases. They are usually in the body and tail of the pancress but may be in the head of the rhad. They are dark red or purplish in color and are home: than the surrounding timues. Their size varies, but t averages between s and s cm in diameter. The benign tumors are encapsulated. They may show aigns of degeneration, but in some cases they are definitely calcited. Microscopic sections of the crits

are typical of silet cells The symptoms of islet-cell tumors may be honey faintness, perspiration, and vertigo or in addition, there may be signs related to the nervous system Wilder has classified the nervous symptoms into three groups (1) disturbances of the sympathetic nervous system with dissinces, names, pallor and sweating (s) disturbances of the central servors system such as convulsions with tonic and clonic contractures of the extremities and (3) psychic disturbances with anorexis, maniscal sciences mental

confusion and come These attacks occur most frequently during penode of fasting or overfatigue at which times the blood-sugar levels are lowest. There is frequently a rapid response to the ingestion of glucose either by mouth or parenterally Whipple has presented treed for differentiation of jalet-cell tumors (i) at tacks of insulin shock coming on during fasting or overfatigue (2) blood-sugar findings of to mem per cent or less and (3) prompt relief from the ingestion of glucose. When this triad is present the possibility I blet cell tomor due to oversupply of insulia sont be senously considered. The differential diagnosis of hypoglycemia is a difficult diagnostic problem. The influence of other glands such as the thyrold, pituitary adrenals and liver on the carbohydrate

Surgery is indicated in the severely ill patients who have not responded adequately to pallative mean ures The transverse or inverted T incision is par

metabolism must be considered

ticularly suited to the operation on the pancreas The gland may be approached through the castrohepatic or gastrocolic omentum. If most of the greater curvature of the stomach is freed and reflected upward practically the entire anterior sur face of the pancreas can be visualized. Islet tumors may be quite obvious or not vaible at all Removal of the obvious adenoma usually is followed by complete relief of the symptoms. However these masses may be multiple and additional tumors should be removed when present. When no tumor can be found the procedure is open to debate. The surgeon may postpone further surgery until the tumor s sufficiently developed to permit its location and removal, or an adequate portion of the pancreas may be resected with the idea of reducing the sucretion of insulus, which treatment as similar to that of hyper thyroidism. This is done with the hope that the removed segment of gland may bear the offending SAMUEL J FORELRON M D tumor

Cole, W. H. and Reynolds, J. T.: Resection of the Duodenum and Head of the Pancreas for Primary Carcinoma of the Head of the Pancreas and Ampulla of Vater. Surgery, 1945–18.

After describing the various operations for primary carcinoma of the head of the panciess reported in the literature by Whipple (1941) Hunt (1941) Ort (1942) Brunschwig (1943) and Child (1944) the authors submit their procedure which they now have done on 5 patients.

A long midding or modified transverse incision is made in the upper abdomen in order to determine whether or not the tumor can be desected free from the superior mesentene, and portal veins. The common duct is next divided as far distally as possible The gastroduodenal and inferior pancreaticoduodenal arteries are then ligated. The pylorus and distal duodenum at the ligament of Treits are then divided. Then a long loop of jejunum is brought up for an end to-side gastrojejunostomy. Into this long loop of jejunum the common duct is transplanted as much distance as possible being left between the site of transplantation and the gastrojejunostomy in order to minimise contamination or exposure to the food stream. The cut end of the pancress was not transplanted into the intestine in this series of patients because to date very little ill effect has been

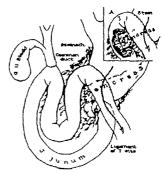


Fig. 1 Technique of the one stage reaction of deodenum and bead of the pancreas adopted after trial with several different types. Note that the common duct as transplanted proximal to the gustinejrunostomy so that the food stream will not pass over it but will pass downward (asserted by gravity) instead of upward and over the transplanted duct as in some operations recommended

Injert shows an alternate procedure of transplanting the cut end of the pancreas into the jejumum. The promisal loop of jejumum is left long to make room for transplantation of the control older and it dealers, also the stump of the pancreas however it need not be so long if transplantation of the stump of the pancreas into the jejumum is not done or contemplated.

observed by the various authors reporting on this subject following complete closure of the pancreatic stump

It is advasable to insert a drain down to the stump of the papereas because a penerestic fistula develops so commonly in spite of efforts to ligate the panere atte duct and close the stump of the paneress with nonaborothele sutures.

One of the first 5 patients operated upon died but as yet insufficient time has elapsed since surgery to determine the prospects of cure.

SAMUEL J FOOZLAGE M D

Danforth W. C. Vaginal Hysterectomy in the Management of Descensus Utsel Am J. Oht. 1045 50 376

In 160 of a little more than 600 vaginal hysterectomies, the operation was done for descensus of

erester or less degree

In 1 case death occurred The patient was a woman in whom the protrusion was about 5 or 6 cm. Shr came through the operation well but got out of bed the first night and was controlled with some difficulty. She developed pelvic inflammation and shortly thereafter pneumonia. The latter was the determining cause of death.

Vagual surgery requires a definite knowledge of the anatomy of the remon in which the procedure is carned out. It also demands a familiarity with the technique of the operations which are done in this field. The specialist in pelvic surrery should be familiar with both the anatomy and technique for the results of operations for descensus done from be low are so much better than those following abdom: nal procedures that the latter should give way entirely. The safety of the operation done from be low is greater and this fact should weigh heavily in the choice of procedure. It is the author's opinion that vaginal hysterectomy rather than the procedures of the Manchester type particularly in cases of extreme descensus, is the operation of choice. In cases in which the descensus is of moderate degree either will serve. As in many patients the uterus has passed its usefulness and especially inasmuch as the cervix is often unhealthy removal of the uterus has a much larger field of unefulness than the alternate procedure.

EDWARD L. CORNELL, M.D.

#### MISCELLANEOUS

Abathanal, A. R., and Leatham, J. H.; Studies in Amenorrheas, Oligomenorrhea and Anousionienocrhea The Effect of Equine Gonadotropin upon the Establishment of Cyclic Menses and Orutation. Am J. Chit. 1945 50 161.

Twenty two patients with climically hypotune thouse oversan activity were studied. These included 5 with primary amenorihes 11 with secondary

amenorrhes 8 with obgomenorrhes and 1 with cyclic anovulomenorrhes. Adjuvant therapy with equine gonadotropin was instituted in these cases the amounts varying from 400 to 4,000 units

This hormone failed to establish menstruation in

3 cases of primary amenorrhea

Of the ir cases of secondary amenorrhes ovulation was apparently stimulated in a although the result in 1 was open to serious question. Only 1 patient continued to have regular menses.

In the 7 cases of oligomenorrhea the equine gonadotropin apparently restored cyclic memes in 1

case but falled to stimulate an ovulatory response

In the x case of regular anovulomenorrhes equine gonadotropin was ineffectual

Nine of these s2 patients were later salvaged with an adequate det and usually thyroid extract

Clinically equine gonadotropin proved to be a rather ineffectual stimulant to the abnormally functioning or hypofunctioning human ovary as far as the restoration of normal cyclic metabolism and the reappearance of regular menatrual rhythm was concrued.

Equine gonadotropin produced similarly poor results in stimulating an ovulatory response in patients with clinically hypofunctioning or abnormally

functioning overies

The principle of beterogenous substitutive therapy with equine gonadotropin may yield far greater harm than any temporary good. The possible harmful results of therapy with equine gonadotropin are (a) a gonadotroic effect on the ovary as evidenced by atnormal stimulation or marked delay in the appearance of the next menses (b) the development of antagonistic (antigonadotropic) substances with neutrilization of subsequent injections of equine gonadotropin, (c) the development of allergic manifestations which may be severe in spite of negative skin tests and (d) the sensituation of the patient to other as yet unknown components of horse serium.

The principle of physiological simulative therapy by means of a mirritonally behanced thet and denccated thyroid extract is far more rational and far more efficacious both on theoretical considerations and with regard to the climical results obtained

EDWARD L. CORNELL, M D

# PREGNANCY AND ITS COMPLICATIONS

Berman W: Congenius Absence of the Sacrum man w.: Congenius America of the bactum and Coccyx Complicating Pregnancy Am J

Roentgenograms of the pelvis of a 20 year old primipara at term showed a slagic fetus with its back to the left and the small parts to the right. The head was above the pelvic inlet and ballotable on palpa was anove the private meet and commence on pulper tion above the brim of the pelvis. The head appeared to be full term in size. The pelvic inlet was asymmetrical. The vertebral column vas straight and terminated at the junction of the last lumber vertebra and the pel de gride. There were two varieties and the per se gittle after posterior marked depressions at the site of the posterior marken depressions at the airs we the posterior superior spines of the thum. There was almost a superior spanes or use inum a acre was amost a complete absence of the interglutest fold, and the subcutaneous tursue and muscle formed a partially loose apron over what would normally be the sac

The uterus responded to labor like amy other nor mal nterns Contractions were regular and of suffi תונק cent strength to require the use of some analycula. The cervix dilated but there was no descent of the

After 54 hours of active labor without progress, a low classic consens section was done. The in fant died shorth after delivery, autopay revealed that died shorth after delivery, autopay revealed that it had a congenital heart lesion and complete atelectats of all lobes of the lungs. A roentgenogram failed to reveal any abnormality of the bony structure of the miant a pelvis EDRARD L CORVERL M D

Chesley L. C., and Williams, L. O | Remai Glomer plar and Tubular Function in Relation to the nor and anount runting in persons in the Hypergricemia of Fre-Ectampus and Ectampals. Am / Obst 945 50 167

Simultaneous measurements were made ante partum of the serum cleanaces of insulin urea, and tirk acid in to normally pregnant women near term, and in 10 women with pre-clampin and eclampin. In all but a of the normal women, the tests were re

In pro-champers and eclampars the aric acid peated postpartum. clearance is reduced in this series, the diminition averaged to per cent. On the a crare, the reduction in uric acid clearance depends equally upon 2 fac ton, vis. (1) a decrease in the rate of glomerolar filtration, and ( ) an increase in the tubular re absorption of uric acid from the giomerular fitrate The increased tubular reabsorption of uric and is the

Published data of other workers have been rein more general of the 2 factors terpreted to support these conclusions. The diministion in aric acid clearance appears adequate to emin in which the hypersteems of pre-ctampals and eclaraneia

# NEWBORN

Leonard, M. F : Hemolytic Disease of the \rabers (Leythrobiastosis Fetalis) / Fella S. Isa

Filty five cases of hemolytic disease of the new born treated at the New York Hospital, New York, in the 6 years from 1938 to 1944, are secmarked. The clinical picture was extremely raned, jaundece, anemia, the degree of crythoblastersh and hemorrhagic manifestations varied independently A high incidence (44 per cent) of sometime discribes was noted. The effects of transfersor was Rh-positive Rh-negative blood and bank blood set typed for the Rh factor were compared. The hare date results following the transferious in raising the hemoglobin and improving the clascal resolutions were equally good but Rh-negative blood turn fusions resulted in a better sustained rise in here globin fewer reactions and lower mortality View form newer reactions and sever moreany one of the martin died, a mortality of 34 per cent. One of the chief cames of death was hemorrhage

Jaundsee out of proportion to or in the abstract of anemia was attributed to impaired lives function This theory was supported by the fact that he prothrombin levels responded poorly to vitama E administration, by the pathological hadage of fairy degeneration and necrosis of the liver and the err

dence obtained from the literature The necessity for immediate transferios is the presence of normal blood levels was questioned, and reasons were given for delaying translation and reasons were given for delaying translation and apernia imperida. Plasma infusions were preferred in

The prominence of hemorrhagic tendences in pa this type of patient. ticats with hemolytic disease of the newborn was cophasized and its relation to low prothomise

Administration of vitamin K to donors of Rhlevels demonstrated. Decretive blood was suggested as a means of trient the prothrombin levels of affected infants CRUMES BURGE, M D

Miller H. C.: The Effect of the Prediabetic Strip on the Survival of the Ferns and the British for the Newborn Infant V Explant )

One of the outstanding characteristics of prenancies in diabetic mothers is the high fetal and foots in contain rate in addition, in some fants born to diabetic mothers there are strike sometic and visceral changes, laderding an increase birth weight, cardisonegaly hyperplants of the users weight, cardiomegaly hyperplans of the islands of Langerham, excessive extraosible erythropolesis hyperplans of the adversal gain and an loresan in the costmobili elements of ill and an loresan in the costmobili elements of ill anneather eliminary house. anterior pituitary body Similar observations is been made on infants born to mothers who were a diabetic at the time of delivery but in later months or years developed signs and symptoms of diabetes. Since all the mothers who have been studied thus far became diabetic during the childbearing period, that is, under 40 years of age, it was considered desirable to extend the observations to infants born to mothers whose diabetes appeared after they had named the fourth decade.

The fetal and neonatal mortality rates and the average birth weight are increased among infants born to mothers who subsequently mainlest diabetes mellitus, even though the latter do not develop the decesse until after forty years of age. The fetal and neonatal mortality rates increase as the onset of maintenal diabetes is approached. Maternal obenity is not a factor in the increased average birth weight of infants born to prediabetic mothers who become duabetic after the age of a Chranes Baron M.D.

Comfort, A.: Congenital Syphilis in an Infant Treated with Penicillin Lexcel Lond. 1945

A syphilitic mother was given 8 injections each of mapharside o o4 gm and bismuth o 2 gm. and a month later gave birth to a child weighing 6 lb 2 oz. at burth. At one month of age the female infant was found to have strongly positive Wassermann and Kahn reactions, and two weeks later developed a rash nasal discharge and dyspnes. Her weight at this time was 7 lb 14 or her frontal bosses were promment her scalp was covered with thick black hair and the upper ends of the tibias were tender and enlarged. The body was covered with a scaly polymorphic maculopapular rash and there was a copious mucopurulent bloodstained nasal discharge The respiratory rate was 36 and moist sounds were heard in all areas of the chest. The temperature now rose to 106 5°F and the respiratory rate to 70 an area of impaired resonance with tubular breathing developed on the right side and extended up the spine.

The child was started on sulfapyridine (1 75 gm.) in 4 hour doses, but on the second day intramuscular injections of 18 000 units of penicillin were started and stopped after 4x2,000 units had been given Thereupon the temperature rose to 108°F but it fell soon afterward to 102 F The general condition of the patient remained about the same the pertinent blood findings at this time being polymorphs 30 per cent and fymphocytes 50 5 per cent Four boar injections of penicillin 9,500 units were started again and in 24 hours the temperature had fallen to normal the nasal discharge had ceased and the pulmonary signs had begun to clear How ever, an additional 95,000 units were given before the drug was stopped. Immediately the temperature rose again and there was a slight return of the nasal dacharge. The epiphyses were larger and very tender Inunctions of ung hydrarg nit fort to the abdominal wall was begun and 4 injections of 0 5 cem of acetylarunn were given every third day After this the respiratory rate was still high but

pulmonar, signs were almost absent. The tempers ture range was lower from 100 to 102 F

Immediately the 4 hour injections of penicillin in 0 500 units were resumed. Once more the fall in temperature to normal was immediate and after a further os 600 units were given it remained down.

Finally 4 days later 100 000 units of penicillin were given over a period of 3 days whereafter all medication was stopped and a week later the Wassermann and Kahn reactions were negative and the epiphysitis had subsided. Thus before the reversal of the Wassermann reaction there were administered 702 000 units of penicillin, and a c. of acetylarizan, also some mercury and potassium iodide. Since then the child has remained practically well and the Wassermann reaction has remained negative. A convergent squint persists but vision appears to be present and there is no choroiditis.

From this experience the author concludes that in these acute cases of congenital syphilis the combined therapy as given in detail should remain the method of choice lown W BREDOWN M D.

# MISCELLANEOUS

Miller N F : Tubal Patency Tests. J for M Ass 1945 129 843

Uterotubal insuffiction and uterosalpunggraphy are widely accepted and well established procedures for the determination of tubal patency or its absence, and the latter is discussed with regard to stenility in the female. This survey of hundreds of tubal insuffictions and 400 cases of uterosalpunggraphy over a 24 year period shows the value of these procedures and has led to significant conclusions.

Genital infection, either sulplingtits or cervicitis in the chief contraindication to the performance of either of the mentioned tubal patency tests like wise pregnancy constitutional disease and pelvic mophasms also contraindicate there tests. Thorough knowledge of the mensitual history and a pelvic examination immediately prior to the test are examinat. The week following mensituation is the most satisfactory time for the performance of either test.

The use of gas insufflation and the intrauterine introduction of radiopaque substances are supple mentary tests both necessary for a complete evaluation of tubal patency the former procedure is used initially and the latter is generally reserved for those cases in which patents is not found following insufflation. In the simple procedure of introducing air or carbon dioxide (preferred) into the uterine cavity pressure observations are essential a rise in pressure (under a constant slow flow of no more than 300 c.c.) to 120 mm and a falling off to from 40 to 60 mm. is encountered with normally patent tubes. A progressive and pensistent rise in pressure is reason able evidence of nonpatency. Lymographic recordings of manometric data are important. In substantiating patency in both tubes or localizing it

in one the symptoms, first of lower quadrant pain and then of aboulder pain should be correlated with manometric readings and with auscultation over the right and left lower quadrants to sacertain if air is excepting from the tubes. The importance of re-

peated testing on successive occasions is stressed Roenteen visualization of the tubes is essential when stenosis or complete tubal closure is revealed by insuffiction, and permits more accurate localiza tion of the obstruction, particularly when salpingos-tomy is contemplated. From 5 to 10 c.c. of a warm organic medium such as linicaled are used and observations are made under theorescopy of the escape of the oil from the ostic or its retention in the taber. immediate as hour, and 48 hour menternormens are emential in each instance as a permanent record and often disclose the late escape of oil or the overence of oil in the peritopeal cavity to refute an earlier impression of non-catency. The therapeutic effect of oil to opening closed tubes has been abserved, especially when the procedure is repeated Although an ideal oil, which is nonirritation and affords a good visual contrast on the x my plate at morbidity attendant on this procedure appears to be elight. On the basis of available data insuffation results in morbidity in less than I per I ooo cases ous embolism is the chief nathological cause in the rare case. The percentage of morbidity following the use of oil is slightly higher oil embolson having been reported in some cases during the earlier years of the development of the tests.

Both tests when used in conjunction with one another and when properly performed are safe and highly informative for the diagnosis of their patency Prints B Casse, M.D.

Rinehart, R. E.: Serum Protein in hormal and Toramic Pregnancy Am J Olst., 1945 50 4E.

Two hundred and fifty-one determinations of the serum protein of 10 normal pregnant women and 30 on 5 pre-echamptic women were made

The everage value for serum globulin remains abnost constant throughout normal and toxenic premandes. During the normal pregnancy the average value for the total protein tends to fall from the nonpregnant level to a minimum during the eighth and ninth mouth and to rise rapidly to normal after delivery it its lowest point this represents a decrease of 7 1 per cent from the nonpregnant aver age. This decrease in the concentration of total protein is confined primarily to the albumin fraction The albumin decreased f om a ponpregnant average valu of 4 0 to 4.0 gm per 100 c.c., a fall of 4 per ent The average value for total protein in preeclampsus was 14 per cent below that of normal women in the same stage of pregnancy. This decrease in total protein is confined to the albumia fraction. It was 13 per cent lower than the lowest ave age alue obtained at any time during normal pregnancy and 33 per cent lower than the average (or normal nonperguent women.

The probable dependency of these changes as known alterations of the function of the liver denis pregnancy has been considered. A total of a stern minations of the serum protein in simultaneous drawn maternal blood and blood of the cost as made. The altumin content of maternal serum of the cord in nearly identical a slight difference is noted in the publical fraction.

laux, N. W., and Rakoff A. E.: Estrogen-Propointense; A New Approach in the Treatment of Habitual Abortion. Am. J. Obj. 1015, p. 101

I study was made of a group of 21 nations only habitual abortion who were treated with estreen and procesterane. These nationts had more threed a total of 80 previous pregnancies from which there had resulted only 7 living bables (o'h) There had been 52 abortions, 13 miscarriages, 2 stillbuths, and I premature live burth in which the bolant did set spreton. Flity-four per cent of the nations had so difficulty in becoming presmant, 8 per cent were a diminished fertility and 38 per cent were of past fertility In note of these patients were there as pelvic abnormalities or systemic diseases visit would influence abortion. In only 1 patient was the basal metabolic rate diminished. Two nations in Rh incompatibilities (Rh-newtire wife and Rhpositive husband) One of these deinered a sound trying behy and the others shorted in seither care did Rh antibodies develop.

Information about the endometrum obtained by biopsy or curettage was available in 11 cases belief the present pregnancy Good secretory function was noted in 7 cases impaired secretory function in 3, and an interval endometrium in 2.

Utine bornoom amays were made in 15 cases provide to the onact of pregnancy. Utine pureductories says made at the midcycles were normal in 15 per cent. Utine extragent samps made at the midcycle and during the third work of the cycle were distribed in 57 per cent, while low or absent pregnance values were obtained in 35 per cent. Since ther studies were made in only one cycle, their significance in limited.

Hormone annys consisting of determinations of the ntns pregnandol, serum estrogens, and semgonadotropius were made early in pregnancy in it cases. In almost all of the cases one or more addtional annys were made and in a cases monthly atskys were done.

On the initial assay of per cent of the cases therefore the initial assay of per cent of the cases therefore the cent had diminished serious astrogram and 50 pc ent had diminished perganathol til to. 18 16 ft to 19 assay studied, both the entropen and our natariol were diminished. These findings indicated efficiency of the corpus literum during the early weeks of gestation and an inadequacy of the photostate to the over its frontions.

Many of the patients had been unsuccessful treated in presions pregnancies with a operation

thyroid, and vitamin E.

During the present pregnancy all patients were treated by the injection of progenierone (10 mgm) and alpha-estradiol bemoste (10 000 nt units) and alpha-estradiot oemeosic (10 000 rat units) given together two or three times weekly. This given together two or three times weekly instructional was generally continued to the period of

There was fetal salvage of 16 babies, or 67 per cent. There were 15 full term live births (with 1 neocent. Ancre were 15 tout term tive out us (with 1 neo natal death due to consecutal abnormalities) 3 pre mature live infants (2 surprived) 2 miscarriages and 4 abortions

Nicodemus, R. E., Ritmiller, L. F., and Leddon, Docume, K. E., Ritmiller L. F., and Leddon, L. J. Continuous Caudal Analicaia in Obatet L. J. t. Continuous Caucas Amaricana in the on Trial Am J. Ohn 1945 50 312

Of 500 deliveries with caudal analysis 469 of the Of 500 octiveties with causas analgeans 400 of the attents had complete relief of pain and 10 had par access and complete rener of pain and 10 had par all relief 15 patients were unrelieved. The authors all relief 15 patients were unrelieved. And extensive state that caudal analysis has given a higher per contains of commission relief to the matter than any state that Chucas analysis has given a higher per centage of complete relief to the mother than any cruisge or complete rener to the mother than any ombination of methods that the contract than any combination of methods that the contract than a contract that the contract t oner person or any communation or methods that they have employed. They believe that no other tacy nave employed incy believe that no other another is required and that it is not necessary aucometic is required and that it is not necessary to call an anosthetist to control the patient for the final delivery and repair

In the authors experience, the patients were carry always ready to cat a little food and drink finish immediately after delivery in fact, many of fund immediately after occivery in fact, many or them were able to do so during the course of their them were able to do so during the course of their shor all of which sided greatly in the maintenance of normal blood chemistry and consequently fluid

The analysis shows that in patients in whom And analysis shows that in patients in waomadal analysis was used the labors were longer there contractions were of less intensity and the

expulsive force of the abdominal musculature was exputatve totce of the abdominal influentative was lost. Spontaneous rotation occurred less often in occipitoposterior positions and operative deliveries occipitoposierior positions and operative deliveries were increased. Breech deliveries were casier and were increased biecco denviries were cases and safer. There was a lower incidence of stillburths a later there was a lower incidence of squantum a control maternal morbidity duminated blood load and the control of the control with delivery less permanent damage to the burn with octivery less permanent termage to the out-cental, and the patients were pleasant happy an co-operative

Hanley B J and Majone C. M : Candal Analgesia nley B J and Majone C. M : Candal Analgesia
in Obstetrics with Special Reference to Repeated Single Blocks Am J Obn 1945 50 306 The authors present the results obtained m a

The authors present the results obtained in a sense of 1935 patients with caudal block. A tech analysis and delivery under renique for complete analgesia and derivery under repeated single caudal injections with 1/2 per cent tetracaine is described. single caudal block technique has a definite place on the practice of obstetrica Its use is varied. It

in the practice of observing the use is varied, its preparate throughout labor for analysis, and declarate the use of the use oe repeated turougaous saou for analysis and the livery. The results with caudal anesthesia for oblivery the resons with causas aucstiness for ou-steeric surgery are very encouraging. Single causal to the causas aucstiness of facility sterric surgery are very encouraging ongse cauda, block, when administered by an experienced indivi-Olock, when summatered by an experienced marvidual under proper conditions. Can be as safe as other forms of analgesia or more so orm of analysis of more so Caudal block administered correctly will give as

Send route as any other form of analysis. The use good results as any other form of shallests. The use or interrupted single caudal quocks for analysis and delivery gives promite of effectiveness and safety for octivery gives promine of energyeness and antery for mother and child Caudal anethesis in obsteting mother and chud Caudai anesthesia in obstetines should be limited to well coursed institutions which have a full time resident or a teaching staff EDWIED L. CORNELL, M D

# GENITOURINARY SURGERY

#### ADRENAL KIDNEY AND URETER

Maegraith, B. G., Havard, R. E., and Parsons, D S.: Renal Syndrome of Wide Distribution Induced Possibly by Renal Anoxia. Lenot, Lond. 945

The authors discuss the nature and distribution of a type of renal failure seen in a great variety of acute illnesses The syndrome is a condition of impaired renal function developing usually in an acute illness and often associated with a transient peripheral cir culatory failure The onset of oliguria or anuria is commonly the first sign. In patients who survive there is also a postanuric period of impaired renal function, with nitrogen retention and often a copious unconcentrated urine. The postanuric period may last for several weeks, but eventually there is complete and permanent recovery. The reversible na ture of the renal fallure is the chief feature that distinguishes this syndrome from the other forms of nephritis

In patients who die the kidneys have a character istic appearance postmortem. They are usually enlarged, with a swollen, pale cortex and often an engorged medulia the epithelium of the convoluted tubules is degenerated, necrosed, or desquamated The damage may be concentrated chiefly in the ascending loop of Henle and in the distal convoluted tubules. The himins of the tubules are usually filled. with debris and with desquamated cells either in tact or fragments. The debris is often stained decoly by the pigments which may be present in the urine at the time the lesions develop. It is a constant observation that the glomeruli and their cansules appear nearly if not quite, normal. The vessels of the medulla on the other hand, are usually en

gorged and often there are apparent hemorrhages

into the luming of the tubules The main features have been noted in widely differing conditions. In blackwater fever incompatible blood transfusion, and in icterus neonatorum there is extensive intravascular hemolysis but in recent years the syndrome has been frequently observed in crush syndrome, in which hemolysis is lacking. In the above mentioned conditions the syndrome is always associated with the presence of pigment in the urine, and it has been thought that the pigment, if not the immediate cause of the anuria is the cause of the damage to the renal tu bules. However experiments designed to establish this have been inconclusive. The syndrome de veloce in many conditions in which abnormal pigment is absent from the urine. In the alkalous of gastric tetany that may arise during the treatment of peptic ulcers similar nitrogen retention occurs accompanied by similar characteristic changes in the kidney There are also many other conditions in which the features of this syndrome have been reported. The anuria the impairment of renal fust tion, and the characteristic microscopic appearant of the kidney have been described in cases of scott abortion, cholera, yellow fever Well's disease, dibetes, hepatorenal syndrome, pernicious anema, ani carbon monoxide poisoning

Three different causes have been suggested. (1) mechanical blockage (this does not account for the many similar cases of annria in which pigment h absent, and it has now been generally abundaned (s) a "nephrotoric effect of some injurious sei-atance carried to the kidney by the blood-strain. (3) renal anoxia, the main cause of renal dames being the temporary deprivation of oxygen.

The nephrotoxic theory demands that a vidvariety of toxins many of them hypothetical or at least unidentified, shall all produce syndromes which are very similar in their clinical and pathological arpearances The situation is not unlike that existing in the study of rickets before the discovery of

vitemins

The authors express the opinion that the evidence at present available favors the hypothesis that read anoxia plays a large part in producing this sysdrome, in that it results in damage to the result epithelium, and consequent impairment of real concentrating power. The oligaria and anaria that occur in many instances are probably the direct at sult of the disturbances of renal blood-flow that follow pempheral circulatory failure If this is cor rect, it has an important practical application, for the prevention of anuria in these conditions will the depend more upon the support given to the circulation than upon efforts to keep the urine alkalise Blood transfusion is the most effective means of providing the depleted blood stream with fresh and carrying power in conditions in which "shock accompanied by anemia, as in translatic hemorrhap and in blackwater fever To be effective however it must be given early

The authors suggest that 'renal apoxis is a

suitable name for the syndrome. TOTTE K NARAT, M.D.

Goyanna, R., and Greene, L. F : Pathological and Anomalous Conditions Associated with Duplication of the Renal Pelvis and Ureter J Um Balt., 945, 54 1

Complete duplication of the renal pelvis associated with complete or incomplete duplication of the ureter is a common anomaly which in itself has no clinical significance At the Mayo Clinic it was found 25 times in 2,000 consecutive autopsies, 15 incidence of 1 25 per cent. It is sometimes contended that daplication makes the upper part of the urinary tract more liable to pathological conditions If such is the case, and i view of its relative frequency duplication may assume clinical important

If some associated pathological or anomalous condition is present one of the segments may be non functioning and therefore roentgenographically in visible, which would create diagnostic difficulties. In a 10 year period 131 patients at the Mayo Clinic presented 154 pathological or anomalous conditions associated with complete duplication of the pelvis and complete or incomplete duplication of the ureters. The so-called bifid pelvis although theoretically a type of duplication was not included for its frequency is so great that it may be considered more as a normal variation than as a true anomaly

The most common pathological condition found associated with duplication was hydronephrosis or hydroureter or both. This was twice as common on

the right as on the left side and nearly twice as common in the lower as in the upper segment.

The fact that the incidence of pyelonephritis pyonephrosis and atrophic pyelonephritis also is higher in the lower segment than in the upper one may be considered a consequence of the faulty drain age of the hydronephrosis. In all cases of ectopic ureter and in all cases of ureterocele associated with duplication, the ureter from the upper pelvis was the one affected

The diagnosis of duplication is usually made with out difficulty by means of an excretory urogram. However if one of the segments is nonfunctioning the excretory urogram may appear normal. The following roentgenographic signs are suggestive of duplication (a) elongated renal shadow (b) the presence of a region of kidney with no means of drainage, or (c) the shape of the visualized pelvis.

Excretory urography alone cannot be depended upon to distinguish between complete and incomplete duplication of the ureters, unless the entrance of both ureters into the bladder is clearly seen Cystoscopy and retrograde pyclography although belpful, may fall when the supernumerary ornfice is hidden or when there is incomplete duplication

A history of congenital incontinence associated with normal micturition is strongly suggestive of duplication with an ectopic ureter

IOSEPH K. NARAT M D

Shearer T P Wiper T B and Miller J M: Renal Carbuncie; a New Method of Treatment J Urol Balt. 1945 54 12

The majority of renal carbuncles reported in the literature have been treated by nephrectomy many instances, the lesion is of such size that con aderable functioning renal tissue is sacrificed. How ever to date, mortality statistics favor the more drastic procedure of nephrectomy instead of incinon and drainage alone or incision and drainage combined with nephrectomy at a later period These mortality figures hold although nephrectomy is often extremely difficult even when a small inflammatory leason is present. The perinephric tissues in these instances are frozen and the kidney is closely ad herent to the surrounding structures, which makes its removal very difficult.

An almost universal observation is that the renal carbuncle is preceded by a cutaneous infection such as a paronychia, boil, or a carbuncle The time inter vening between the cutaneous infection and the on set of symptoms due to renal disease varied from a few days to many months

The symptoms are usually nonspecific in nature and do not point directly to the unnary tract as the seat of the difficulty. Malaise at times progressing to prostration chills, and fever is present. Urinary symptoms are lacking. It is not surprising there-fore that the average length of time between the onset of illness and the institution of surrical treat

ment has been 66 days.

The authors have had occasion to treat an individual with a renal carbuncle successfully by incusion and drainage, combined with the administration of penicillin via the systemic and local routes. The patient was a 20-year-old white male whose presenting symptom for 2 months was pain of moderate severity in the left lower chest and unper abdomen. The pain was associated with temperature of a septic type which at times was as high as 103 degrees Upon inquiry the patient stated that 4 days before the onset of pain he had had several boils on his face and 2 carbundes in the right cervical region.

Laboratory examinations gave no information. The patient presented a few moderately enlarged lymph nodes in the inguinal regions and the inter costal spaces Special studies of blood smears did

not reveal evidence of a blood dyscrasia.

A review of the excretory programs made before submission of the patient to treatment demonstrated the calycine compression mentioned before. Retrograde pyelograms revealed that the middle and lower calyces of the left kidney were amaller than normal and were pushed medially. There was no alteration of the paoas muscle shadows in these roentgenograms.

The preoperative diagnosis was renal carbuncle. As penicillin was available for postoperative therapy incision and drainage was deemed the procedure

of choice. The usual lumbar incision for exposure of the left kidney was employed. This incusion was satisfac tory but exposure was technically difficult because of the great number of adhesions which bound the kidney to the surrounding structures. Some increase in exposure was obtained by subperiosteal resection of a segment of the twelfth rib The kidney was freed to the hilar structures anteriorly and posteri orly and carefully palpated. An aspirating needle was passed into several suggestive areas and puru lent material was finally obtained from a site deep in the substance of the kidney at the junction of the upper two-thirds and the lower one-third Subsequent needle punctures delineated the cavity which was entered with a ureteral scalpel. Ten cubic centimeters of thick purulent material were released and a No 16 F catheter was sutured into the cavity Bacteriological examination of this material established the presence of a hemolytic staphylococcus aureus in pure culture. One l'enrose drain nas placed at the upper pole of the kidney and a second one at the lower pole. The wound was closed in

Penicillin treatment was instituted and 200,000 units of the drug were administered intramuscularly every day. In addition the abscess cavity was lavaged twice daily with 5 c c. of a solution of penicillin containing 250 units per cubic centimeter The response to treatment was gratifying A scanty serous discharge persisted for about 3 days. The operative wound healed nicely and the temperature gradually became normal Improvement in the gen eral condition was rapidly apparent Retrograde pyclography as days after operation revealed complete restoration of the calveine structures to normal. JOHN A. LORY M.D.

Tahara, C., and Hess, E.: Massive Renal Fibrolipoma J Ural Balt., 943 54 07

Two enormous fatty tumors of the kidney are herewith reported. It is interesting to note that these tumors had existed for a considerable period of time, that they caused, apparently hypertension and loss of weight and that they were both associ ated with a unilateral chronic pyelonephritis. In both of these cases, nephrectorny has reduced the blood pressure to somewhere within normal limits. Both patients were markedly improved by the sur gery and both cases must be considered as benigu from the pathological reports, but with definite ma lignant characteristica. JOHN A. LORF M.D.

Goldstein A. E. and Klotz, R.: Ligation of a Super numerary Ureter A Clinical and Experimental Study Am J Surg 1943 70 13

Intentional ligation of a ureter without performing a nephrectomy is rarely ever done except in experimental work. Intentional ligation of a super numerary ureter without performing a heminephrec tomy is the subject of discussion in this article.

The clinical application of ligation of a super numerary ureter was used by the authors in 4 instances on a private patients, a patient having the operation performed bilaterally because of pain in bilateral supernumerary fused kidneys. The operation in all of the cases was performed because of pain either in the lumbar or abdominal region. In 3 cases the discomfort or pain was on the left side, whereas in a case it was bilateral. The pain had been present between 6 months and 7 years. It was intermittent at first but later became constant in all of the cases, and, although not sharp was very acute in 2 cases, simulating either a kidney color or Dietl's crisis. Activity seemed to increase the pain. None of the patients showed any evidence of infection either by the presence of pus or organisms. All were females under 40 years of age 1 having borne children, whereas 2 had not. Two of the 3 were married.

Functional studies revealed a good output in the opposite kidney as well as a good excretion in the lower normal segment. The function of the store numerary or upper segment was found to be be The capacities of the pelves of the upper represenwere less than those of the lower ones, ranging be tween 3 and 5 cc.

The pyelographic studies were made both by the intravenous and the retrograde method, and h ye observed in all of the cases that the pelves and the calyces of the upper segments were smaller than the pelves and calyces of the lower ones. A reproducted of the pain was obtained in all the cases by heat-

the supernumerary segment with water Numerous dilatations, first of the supernamena ureter and then of the other ureter on the same it's were performed in all of the cases. The number of dilatations of the supernumerary ureter varied for 3 to 18 In 1 case the supernumerary ureter per sented a real structure at the orline. In the other cases a No 6 catheter met a alight obstruction while was casily overcome. \one of the cases showed a dilatation of the supernumerary ureter

The emptying time seemed to be normal from a to 8 minutes, in all of the supernumerary segments

Previous to the operation a catheter was placed in the supernumerary ureter. The ureter was coposed extraperitonically through a Gibson because The midthird of the ureter was selected for the ligation. After the ureter had been freed for a shot distance, 3 chromic catgut ties were placed area it, about 16 cm. apart. The ureter was cut so that ? of the ties were left on the lower portion and 1 was left on the upper portion a small portion viremoved for examination. The upper portion of the ureter was observed for a few moments but no properceptible dilatation occurred. No leakage of sthe resulted from the operation so that the wound was closed without drainage.

All of the wounds closed by first intention. Perliarly enough, while the patients had some pas after operation, which was the result of the operation, they all claimed it was of a different type Is all, the original type and location of pain scened to have disappeared immediately after the operation

Pyelograms of the remaining kidneys were make by the intravenous route. When the prelograms were made it was observed in all cases that the dedid not come through the supernumerary segment but through the other a kidneys in normal time and that the appearance of the remaining prives was the same as in the original retrograde pyclograms.

The patients were discharged in from 13 to 11

days.

In this study it was observed that after a arter's ligated and cut a hydronephrosis immediately start-Although this never assumes a very large size, it s present. From a functional standpoint, the stirceases to secrete very shortly after ligation, which fact was also borne out by the experimental work. so that when an intravenous pyclogram was made no dye was found in the kidney pelvis or calyer

The pain appeared to subside almost immediately after the ligation although there was some acte a the lumber region for about 3 months in 2 of the CESCS Which was described as a different type of pain This was probably a postoperative ache that might be encountered following any operation These cases have been followed from 6 to 7 years.

# BLADDER, URETHRA, AND PENIS

Sexuly E. A. Bliharzianis of the Bladder (Vesical my D. A. Diffurziones of the Discourt (veer Schistosomiasis) J Urol Balt., 1945 54 39

The organisms producing bilharxiasis of the blad der are the blood flukes, schistosoma hematobia discovered by Bilbars in 1851 They are small white worms belonging to the phylum platyhei minthes, and are sexually differentiated trematodes. Their home is, primarily in the vesical venous their home is, primarily in the vesical venous their blerus of man Here the male, a short, somewhat flat worm measuring from 10 to 15 mm in length and a about I mm in breadth, mates with the female, which is more threadlike, and measures about 20 mm. in length and 14 mm. in breadth Each is equipped with two suckers, one at the proximal end and another on the ventral surface slightly candal to the first These suckers permit them to adhere to the venous walls, which avoids their haphagard dissem ination by the flow of blood. The fertilized over are deposited singly in file by the female along the courses of small submucous veins of the bladder The eggs are deposited one directly behind another until no more space remains. This is then repeated from venule to venule, which not infrequently severely obstructs them. It is estimated that a pair of schistosoma hematobia may live as long as from so to 30 years, continuing this process throughout their lifetime. Eventually the eggs crode the wall of the venule and drop into the bladder cavity Being free within the cavity of the bladder they are readily voided with the urine To permit survival the ova must come in contact with fresh warm water im mediately after voiding From the ova, a miracidium larva emerges which, after a free life of about 6 hours enters a fresh water snail and seeks out the snall a liver where it passes through a sporocyst dage multiplying many times in number through a budding process, and then emerges from the snall as forked tailed larvae or corcariae. As cercariae, they swim about freely in the water and must find a human host within 48 hours in order to survive With suckers, they attach themselves to the human skin, shake off their tails and burrow through Fatering the blood vessels, they eventually find her way to the liver where they grow to adult male and female After attaining maturity they migrate to the visical venous plexus where they mate and egg laying occurs, thereby completing the cycle The symptoms of bilharriasis of the bladder may he divided into four stages

In the first stage symptoms of skin irritation occur at the rate of entry of the larva These may be slight to severe pruntus and may completely escape the patient s attention

During the second stage, generalized toxic symptoms may occur. The time interval is from 4 to 12 weeks after exposure. Again, these may be so slight as to not require medical aid. However headache backache, and chills and fever with night sweats are the symptoms of which the author's patient com plained upon his first hespitalization and they correspond to the migration of the parasites and the first egg laying by the females. At this time, the blood shows a leucocytosis and high eosinophil count. Not infrequently the abdomen is tender and

In the third stage, symptoms of bladder irritation Lecome prominent. There is urmary frequency dysuria, and hematuria. Ove are now found in the urne. This stage corresponds to the bladder condi tion observed by the author in his case at the cystoscopic examination a confluent papillarylike growth was found to cover the entire trigone. The greas surrounding the ureteral orifices were especially involved Beyond the trigone on the posterior wall of the bladder three isolated areas typical of the trigonal involvement were present. This finding in the bladder could hardly be confused with a true papilloma because it was lacking in the fine villi and presented a deeper red to slight purplish color The appearance was neither that of a papilloma nor of a bullous edema rather something midway between Interspersed in the area involved were several dis crete yellow to gray nodular masses.

The fourth stage corresponds to the symptoms and pathological changes encountered in its many and varied forms from the time of the passing of the ova in the urne to the death of the patient unless treat ment is instituted During this stage, the bladder findings are typical of the changes encountered in long standing chronic bladder arritation. There is proliferation of the mucous membrane with subsequent necrosis ulceration and secondary infection Secondary stones are common and phosphatic de posits frequently cover large areas of the inflame bladder wall Subsequent fibrosis and scar tissu occur The bladder capacity is diminished, at time to the point of complete incontinence. With bladder to the point of complete incontinence. fibrosis and contracture in which the lower urete take part ureteral obstruction progresses. Hydr nephrosis, renal infection uremia, and sepsis follo The secondary pyogenic infection may exte through the bladder wall and urethra, produc penyesical and penneal abscerses with suprapul perineal and rectal fistulas. Flephantiasis of genitalia due to interference with lymphatic dri eventual malignant changes may occur proc age has been reported the characteristic findings and symptoms, and to eventual death from papillar, cardnoma of bladder. In severe infestations, the prestate seminal vesicles are also frequently involved w results in infections, abscesses and fibrosis of organs. Ova have been found in the semen of cases In women the disease is less frequent vaginitis, cervicitis ulcers papillomas of the v and carcinoma of the bladder have also been re-

Fairley a complement fixation test is said to give a group positive reaction during the latter part of the incubation period. At the present time, the dag mosts of bilibaritaist of the bladder must await the symptoms and findings of bladder disease. Ove containing the characteristic terminal spine in the voided urine, the cystoscopic picture and biopsy of the effected bladder wall clurch the desposis.

The author's patient was treated with fundin a trivalent sodium antimony compound. It is administered inframuscularly in the dougge of 50 cc on alternate days after the first two injections of 15 and 50 cc. or typen on successive days. A total of ano

c.c. is given over a period of 16 days.

The necessity of early diagnosis as well as early, proper and adequate thrapy is absolutely essential if a complete civre is to be attained. Prevention of human infestation is, of course, the first and most important problem. In countries such as Egypt swamps and lakes have been drained the counses of streams changed vegetation laborously removed from lakes and stream to starve the small, the in termediate host and wholesale poisoning of the smalls has been done, but without any noneworthy success. The fundamental approach lies in the education of the natives and in winning their cooperation in presenting themselves early for treat ment.

#### Oppenheimer G D : Late Invasion of the Bladder and Proetate by Carcinoma of the Rectum or Sigmoid J Urol. Balt., 945 54 162

Fifteen cases of late invasion of the bladder and/ or prostate and seminal vesicles following abdominonenneal resection for cancer of the rectum or for obstruction due to sigmoid cancer are reported Direct involvement of the lower urinary tract by cancer of the lower bowel occurs frequently in so autopsies of patients with cancer of the rectum, 20 per cent of whom had a rectal resection the bladder was found to be invaded as times. Bladder prostate and seminal vesicle involvement in the male, and bladder and uterine involvement in the female, apparently takes place by direct extension. Twenty two of the so cases (44%) showed compres alon of one or both preters. Metastages to the preters or kidneys were uncommon. At least 10 per cent of the patients who survive abdominoperineal resection have late involvement of the bladder prostate, or seminal vesides.

Palliative prological or surgical measures and radiotherapy abould often be attempted even after lower urinary tract involvement because life may be prological this was shown by a reported cases. In one an obstructive signoidal resection was per formed for infiltrating adeoncarinoma after preliminary eccotiony a years later cystoscopy was performed for bematuria, and a 1½ cm, posterosuperior bladder tumor was fulgurated two years later another tumor reported as adeoncarinoma was refulgurated. The second patient had a finaurethral resection of recurrent adenocarmons is volving the bladder neck and prostate, 7 years the abdominoperinest resection and rudotherapy likelogically the transurethrally resected these wadefinitely secondary to direct extension from the residual rectal growth.

The results obtained justify attempts to undersigradical surgery even though the local lesion is first to the surrounding structures, and also justify laterallistive underical theraneutic efforts.

DAVID ROMBORIOGE, M.D.

#### GENTAL ORGANS

Greens, L. F., and Thompson G J : Transmettel Prostatic Resection in Patients with Advancel Renal Insufficiency J Urel., Balt. o.s. u. 16.

Transurethral prostatic resection can be performed safely in the presence of advanced real insufficiency and suprapolise cystostomy prefinancy to prostatectomy is no longer consider necessary. By means of transurethral postatic is section free unleasy dramage through the attent question of the property and safely restord questions of the prostation of the present of the present

Fifty four case reports are presented, in what transurchrist prostatic resection performed is the presence of severe renal insufficiency is denotive. The blood urea was well shove too mgm, per rocci in every case and resection was performed when blood urea, eithough rendeed, still remained an mgm, or more in the large majority of patients in unca was higher than 150 mgm, per 100 c.0 filod and in almost hall it was more than 200 mgm or co. or, or the youngest patient was 40, and its oldest 70. Fourteen patients had severe hypericanon, and to had cardiac disease. Prodound actions was present in every case. In practically every case the urine specific gravity was furst and less than

1 015
Preoperative treatment consisted of urethal citieter drainage the intravenous administrates of
sluds so that the daily unitary output was between
2,000 and 3,000 c.c. the intravenous administrative
3,000 and 3,000 c.c. the intravenous administrative
5,000 and 9,000 c.c. the intravenous administrative
1,000 and 1,000 c.c. the intravenous administrative
1,000 and 1,000 c.c. the intravenous administrative
1,000 c.c. the intravenous administr

was completed within two weeks.

Prostatic resection was unaily performed asidspinal anesthesas, and occasionally under pentidals
spinal anesthesas, and occasionally under pentidals
socioum. In more than half of the cases it was a
necessary to remove more than so got, of prostattissue in order to relieve the obstruction could side
frequently the prostate glands were small
frequently the prostate glands were small side
fall use in the diagnosis in a number of cases is who
fall use in the diagnosis in a number of cases is who
fall use to remove all of the obstruction glands
and anorexis. Particular care abould be taken to
remove all of the obstructions tissue

Of the 54 patients, 1 died of coronary occlusion 2 ays postoperatively More than half of the pa ents were able to leave the hospital within 2 weeks. The instillation of 1 750 solution of gentian violet into the bladder was the most effective method of stimulating the return of vencal tone. In some patients, when the blood urea had remained stabilired preoperatively in spite of further drainage and intravenous fluids, resection resulted in a fall of the

Follow up on 45 patients showed that 29 were ures concentration of the blood. I've and 10 were dead at the time of the report o red in less than I year 2 in 2 years 2 in 3 years, and be remainder in from 5 to 8 years. Of the patients live at present, more than half have lived three or nore years since resection Although many patients had gastrointestinal symptoms prior to resection

none of them has had a recurrence.

Transurethral prostatic resection can be performed on patients with advanced renal insufficiency with unimal risk, and the surgeon should not heatate to erform resection in cases of this type It has esulted in great economic advantage to these atients. Thus transurethral resection has provided ungical relief of patients suffering from prostatic obstruction and renal insufficiency DAVID ROSENSLOOM, M.D.

Hey W H: Asepsis in Prostatectomy Brit J

In an effort to devise a technique of prostatec tomy with an asepsia emulating that of other surgical procedures, the author has experimented with operative possibilities in the cases of more than 600 patients during a period of about 6 years. The present study however is based on only the last 300 patients of the series after the experimental period had passed and the methods had become more or less fixed. In this technique, the author repudiates all use of the catheter or indeed of anything passed through the urethra. If it is necessary to relieve stress in acute retention he believes that the ladder should be punctured suprapublically with a pinal puncture needle. All manipulations are carried out suprapublically the bladder is decom pressed at once and the full prostatectomy is carried out in the normal way After the prostate has been enudeated meticulous hemostasis is provided by means of a hemostat to which is attached the dia thermy cable, deep bleeding being rendered ac confide by the commonly advocated removal of the V-shaped, or semicircular, portion of the trigone by means of a "live needle held in the laws of the hemostat. Any blood dots are removed by suction and not with a swab A couple of ounces of 5 per cent sodium citrate solution will prevent further clots in the prostatic bed and bladder

A rabber tube is then passed from the bladder through the urethra in a retrograde fashlon with the attached remnant of the prostatic crethra as a guide. To pass this tube the distal end is tied to a black French bougie with its bulbous proximal end

cut off The rubber tubing and bougle are well covered with acriffavine-vascline, which it is hoped will act as a pack around the tube within the urethra.

The bladder should be securely and completely closed after which it is suctioned to evacuate Ci trate, air and any blood dot the last being rare. From 2 to 10 or of sodium citrate solution are left in the bladder and a spigot is inserted. This spigot is removed about two hours after the operation and the tube is connected with further sterile tubing and let into a sterile Winchester bottle of sterile water

It takes from one day to one week for the unne to become clear but if the clearance is delayed for more than 3 days infection must be suspected. Hema turia not requiring interference occurred in this series of cases in the author's opinion this indicates

The operation is done under low spinal anesthesia and the patient is out of bed every day after the operation if only for a few minutes Chemotherapy, which consuts of not more than a half gram of sulfamethazine or sulfathiazole every 6 hours, is stopped on the fourth day but is renewed with the greatest intensity at the alightest sign of sepsis.

With this method (roughly outlined here for the purposes of this abstract) the author procured results which are characterized as starting the more so as during the period of this series of operations only 335 cases of definite prostatic obstruction were The surgeon refused to operate in only 6 instances in 5 patients death seemed imminent and in the other patient the condition was surcomatous. Twenty nine of the 335 patients refused operation or went elsewhere, and 300 were operated upon.

For the purpose of analyzing the mortality the material is divided into four groups

Group I consisted of patients in whom there was no marked systemic disease In this group the residual urine at operation was 6 ox. or under indigo-carmine was passed through the urethra in less than 10 minutes and the urine was normal usually acid, and the blood urea 50 or under This group included 189 Group 2 included patients with mild systemic patients with 4 deaths.

disease an indigo-carmine output in 15 minutes or less, a residual urine of under 15 oz. and a blood ures of 80 or under The urine was often infected sometimes the pyuria was marked. In this group 31

prostatectomies were done, with 5 deaths.
Group 3 included patients with marked systemic disease usually cardiovascular the residual unne ranged from I to 5 pints the blood urea commonly varied between 80 and 200. In this group were 31

Group 4 was made up of those patients who had operations with 5 deaths. blood ureas of over 200 and who showed evidence of cardiorenal failure, with edema, uremic anemia or This group (expressing an attempt to find the limit of ascrptic prostatectomy') included

Thus there was a total mortality for the 300 pa only 6 patients, with 4 deaths. tients of 6.0 per cent This mortality cannot of course be compared with previous figures for the operation because of the lack of figures in other statistics with reference to the preoperative mortality with suprapoble drainage or with the indwelling catheter that is, spelic prostatectomies. However a comparison can be had with the former results obtained by the author in that the present mortality is probably about one-fifth of what it was 6 years ago 6 years ago. Joan W B Levan, M D

#### Barner J L.: Teratoma of the Testis; Report of 65 Cases. Am. J. Reenig 945 54 257

Teratoms of the testis was observed in 65 patients during a 33 month period. These cases made up 7.86 per cent of all the malignancies admitted to the author's hospital. The average age of the patients was 28 years.

The cause of testicular tomors is unknown. It is thought that abnormal development, especially ectopic or undexeemed testes, may be a factor. This was present in 3 of the 65 cases. Trauma was mentoned in 31 instances, but apparently the trauma served only to direct attention to the tumor.

Trauma as an etiological factor is still disputed Early diagnosis is of prime importance. Twenty seven (41 5%) of the 65 patients were treated for other conditions before a malignancy was suspected. (The rapidity of the development of metastases in teratomas is unbelievable at times. The abstractor recently saw a patient who was treated for a hydrocele. The chest film was negative. In less than 1 month the patient developed a large liver which filled the epigastrium and the chest film revealed numerous metastatic depositions throughout both lung fields.) Forty-five of the patients (68%) had painless swelling 14 (21 5%) complained of pain and 6 (9%) complained of a feeling of heaviness or Three-fourths of all the patients were dragging treated within a year of the time the tumor was noted.

The history and course of the condition may be suggestive of testicular tumor A smooth rapidly strowing mass, inguinal adeapathy neuralga ten demos to palpation, and nontransillumination to light are a few of the disposite findings. Teratomas must be differentiated from epidlymitis, hydrochematocie, guamas, and tuberculous and chronic orchitis. If there is doubt as to the diagnosts, a surgical exploration should be performed. Most of the tumors were found to be of the embryonal type, adenocardinoma, or embryonal carcinoma.

Treatment consisted of a combination of surgery and frendation. The surgery was radical orchiec tomy and when possible, it was followed by Iradia tion on the third to fifth day. The cases were divided into those with no metastasis or with symptoms of less than 0 months and those with metastasis or with symptoms for longer than 0 months. In the first group the operative site, mikabdomen, rejigastrium, posterior sacrum, abdomen, and fanks were treated. In the second group in addition to the afortmentioned fields, the internal abdomen,

chest, and supraclavicular region were also treated. The following factors were used 220 kyp., 15 m., 50 cm. target skin distance from 0.5 to 1 ms. steepper plus 1 mm. of aluminum for filter, and from 200 to 250 r per each of two portals daily str.

t tal dose of between t 600 and 2 000 r per portal \ careful f llow-up was made and after B month only 7 of the 65 pattent who habe treated had died. The others were living and sel. MAURGET S SURM M.P.

### MISCELLANEOUS

Forsythe W E., Jr., and Karfan, S. C.: Emerican Young Male Adults. J. Ural Balt 945, 34

All cases of enuresis warrant complete study A history is taken and specific prological questions are The physical examination and laboratory is vestigation are routine. The patient is then placed under the joint observation of the prologist and the neuronsychiatrist. The former has excretory ungrams made and performs cystoscopy and said other prological procedures as appear indicated The patient is examined both neurologically and mentally A cystometric study is then made as studied in detail. Emphasis should be placed on the importance of cystometry in the study of enurch By this means intravesical pressure changes also are produced by detrusor tone or activity is nsponse to the introduction of known amounts of fluid are observed. Correlated with this is a sensor) analysis. The authors prefer the use of a modification of the Munro water cystometer

The following components are observed

Sensation

a First desire to void

3 Capacity This is normally from 350 to 450 c.c. and, as expected, varies with the reflex arc.

4. Intravesical pressure curve

Uninhibited contractions

6. Initiation of urination Residual prine.

The following classification of the causes of enresis therefore seem quite logical (a) organic, are genital or neurological, and (b) functional.

The treatment of enures is based primarily upon making a correct diagnosis. It is quite obvious that attempted programs. In it may be obvious that attempted programs. In cases in which local unpathy is discovered, endication of this process usually followed by creastion of the process. The good results which follow urethral dilatation, sive intifflation, and vesical layage may have been one in many instances to the inadvertent treatment of the local pathology.

The treatment of neurological cases remains very difficult. In addition to the old remedy of limitation of fluids, parasympathetic depression may as it reducing the uninhibited contractions. In general, it has been found that these cases at best respond slowly to therapy Jonn A. Low M.D.

Free, A. H., Huffman L. F. Trattner H. R. and Brown H. B. Oral Penicillin in the Treatment of Gonorrhea. J Lab Clin. M., 1945 30 738.

All of the patients in the authors series were diag osed as having gonorrhea by means of positive ultures, clinical signs symptoms, and history The mures, chancer signs symptoms, and matery and sendallin used was in the form of a dry powder con lained in sclatin sleeve capsules. Each patient in gested a total of 1 600,000 units of pentillin over a 2 day period. The dosage schedule required that 100,000 units be taken every 2 hours during the waking period Two urethral cultures in the male patients and 2 urethral and 2 cervical cultures in the iemale patients were obtained during the 10 day period following treatment, and in most of the pa tients a third culture was obtained at a somewhat

Altogether 14 patients with gonorrhea were treated by the technique described In all instances later time. only negative cultures were obtained following the treatment, and all of the clinical signs and symptoms of gonorrhea disappeared. JOHN A. LOEF M D

Cutting, W C., Halpern R. M Sultan E. H. Armstrone, C.D. and Collins, C.L.: Penicillin by Mouth for Gonorrhea J Am If Ass 1945

Extensive trials of the administration of penicillin ly mouth, with various enteric coatings and adjuants to protect the penicillin or promote its absorption, resulted in the following useful combinations mixtures of penicillin with tri isopropanolamine, trisodium carrate, or sodium carbonate enclosed in a

resin-cellulose plastic enteric coating When the dose of penicillin was 50,000 units, administered every 2 hours for 10 doses these superior combinations produced penkcillin blood concentrations of from 0.03 to 0.05 unit per cubic

Fifty three cases of acute gonorrhea were treated with several of the most promising combinations, centimeter

Treatment of infections with highly susceptible with cures in 38 or 72 per cent bacteria by orally administered penicillin appears to

Dyar R., Scholtz, J R. and Hammond, E. C.: Penicillin Treatment of Previously Untreated Acute Gonorrhes. Am J Syph., 1945 29 562

Four hundred and ninety-eight patients with previously untreated acute gonorrheal urethritis were treated with penicillin Eighty three per cent of those treated with 50,000 or 75,000 Oxford units were considered cured on the basis of negative smears and/or cultures thereafter Ninety-one per at of those treated with 100,000 units of penicilin

the considered cured on the same basis. All pa tents failing to respond to the first treatment were subsequently cured by retreatment with penicillin The proportion cured did not vary significantly with the duration of symptoms prior to the institution of

There were no treatment reactions of treatment

Cases responding to penicillin therapy showed significance early clinical improvement and were generally bac teriologically negative 24 hours after treatment. The validity of the criteria of cure used was established by the re-examination from 6 to 12 weeks after the last treatment observation of 119 of the individuals originally considered cured on the basis of 21 days of post treatment observation Among the 119 cases selected at random there was a positive smear or culture after rigorous tests of cure, in only one TORN A. LOUP, MLD

Lydon F L Trichomonas Vaginalis Infection in the Male. Bril II J 1945 2 384-

The frequency of trichomonas vaginalis infection in the female has for many years been recognized but the similar infection in the male has not re ceived the attention it ments, since it is by no means an uncommon cause of urethritis. During the past few years the author has seen numerous cases of this nature, some of which he was fortunate enough to observe over many months, and the results of his investigations are put forward in the hope that with a higher index of suspicion when confronted with a especially one showing a tendency to relapse and chronicity other workers will discover that many of the cases are due to infection with

As for all chronic conditions especially when trichomonas vaginalis. subject to remissions there are a multiplicity of cures. It is the author's opinion that, at this time there is no specific treatment for the condition al though many methods have been advocated to bring about amelioration of the signs because the propensity to relapse is similar to that in the female even when no further exposure is possible. It is essential, therefore, to prolong surveillance over Recently the administration of mepacrine hydrochloride, both in the usual dosage and by the intensive method now employed for malaria has been tried, but although the discharge decreased to a very alight amount and the active organism disappeared from the ducharge the tell tale resisting cell could still be found on careful search This drug may prove a failure too when subjected to the test of long surveillance

Lehr D : Experimental and Clinical Studies with of Discontinued and Camical Studies with California (p-Aminobenzenesulinys) (p

Comparative studies of the acute and chronic tox icity of the sodium salts of sulfacetamide sulfadia zine and sulfanilamide have been carried out in al bino rats by the intraperitoneal route of drug administration.

Figured on the basis of the medium lethal dosc (LD50) sodium sulfacetamide possesses by far the lowest acute toxicity being about five times less toric then sodium sulfadiarine and more than seventeen times less toxic than sodium sulfanilamide Rased on mean values of the highest blood levels reached with fatal dosages of the three sulfore mides the relationship of the scute toxicity of sulfacets mide sulfadioxine and sulfanilamide is as t to a to 10. (This relationship is expressed for equal weight amounts of the respective sodium selfs )

The chronic toxicity of sodrum sulfacetamide is likewise lower by far than the toxicity of sodium sulfadiagine At a daily dosage level of o 6 pm. per kem body weight continued over a period of a weeks, sulfacetamide caused no significant nathologi imenatomical lesions. The equipolar amount of sulfaduatine (o 7 cm net kgm ) however invariably produced severe organic damage particularly in the sidneys and in many instances also in the aorta

The mechanism of the nephrotoxic action of the sulfonamides was discussed. The low renal toxicity of sulfacetamide was explained as being due to its high solubility (in water sulfacetamide is about the times as soluble as suitadiazone) which apparently precluded the serious consequences of massive and long-lasting intratubular deposition of crystals

which occurred from sulfadiazine

The rendy absorption and rapid renal elimination of sulfacetamide as well as its high solubility per ticularly in urine made it northle to obtain high urine concentrations in the presence of relatively low blood levels

In in vitro antibacterial experiments it was found that sulincetamide exerted a powerful effect against Excherichia coli communior even if very large looc ula were used.

In comparative studies of sulfacetamide sulfa thursde and their succinal derivatives using a streptococcus strain freshly isolated from a patient with injection of the prinary tract sulfathiazole proved significantly more effective than sulfaceta mide in low concentrations (x to 10 mem, per cent) whereas in concentrations generally obtained at the bedside under routine treatment (50 to 110 mgm. per cent of the free drug) there was little difference in the antibacterial effect of the two compounds

Confugation with succinc acid at the para-amino group decreased the bacteriostatic activity of both

compounds very markedly

The results of these experiments suggest that from a pharmacological and toxicological standpoint, sulfacetamide deserves preference over other sullons mides now in use for the treatment of infectious of IOD A LOST M.D. the arinary tract.

Kerser L. D: Studies in Urinary Calculosis. J West Balt, 1945 54 94

The author has tried to fit together some of the evidences of the origin of urinary calculi from the physicochemical, bacteriological and pathological standpoints as revealed by animal experimentation and the study of stone forming kidneys. He presents the concept of a stone-forming pyclonephritis which parallels in some degree that of other tops of crystalline deposition in tissue

Among the contributions of our repeation to stone treesich, four am outstanding

- I The demonstration of lithicals in viteme.
- starved animals 2 The experimental production of store is
- animals by excessive excretion of crystalloids arch a oxamide calcium oxalate and calcium carbonate with later clinical confirmation of such a bree excretory mechanism in hypernarathyroid deserin gout, and in certain pnexplained hypercal louise.

1 The production of calculi in animals with

type-specific bacteria.

4 Tracing of the morphogenesis of aseptic store arising on calcium plaques or in crystalline dorsel

pyramidal tubules.

The implication of each of these different approaches remains intensely controversial as a denorstration of a single rause of stone. The author he lieves that we must revert to the execut that calculus formation is one and only one of many types of crystalline deposition or lithification is tiesues. In other words, urinary calculus is not a disease entity but represents a variable physical form of concrement building which may result from

consily variable conditions

Physical chemists teach us that crystalloid color aggregates arise when water insoluble crystaller matter is deposited in the fibrillary mesh or organi colloids which are proceeding from the state of set to that of irreversible cel. The electrodynamic much action of colloidal matter is of great magnitude as crystals are enught in the interstices of rolls colloids, they undergo changes in form and in polarity with rearrangement internally. The results in a variable increase in density and to some extent determines the ultimate form which the crystalloid-colloid aggregate is to assume. Again, this accordary internal crystallization dependent of sorface interaction of the forming concrement, determines the lobulation lamination, Liesceang pag formation, the roughness or smoothness of the serface the variable densities of surface and interareas of the stone, and perhaps the size of the concrement itself. The contour of the calculus is, of course modified by the contour of the calrs of pelvic wall to which it was originally attached However the electrochemical surface interaction of forming concrements is of the greatest importance even in this respect. Such a physicochemical concept of concrement building explains the poly morphism of stones seen clinically

Outstanding among the efforts at dissolution of unnary calcull are the use of acid irrigating solo tions, such as dilute aqua regia and phosphone add the use of acidifying drugs and diets by mouth, the production of so-called hydrotrophic substances greater concentration in the urine, as in the ass sodium benzoate and glycocoll to form hipporic acid by Snapper Bendlen and Pollak, and the application of calcium-dissolving chemicals such as Albright's citric acid sodium citrate solution and Su by's solution of magnesium acid-sodium citrate. The latter seems most popular at present The reported cases of dissolution or partial dissolution of stone for the most part represented dissolution of soft, pultaceous, calcareous material However in he many roentgenograms illustrating stone disintegration following these techniques few show conquere dissolution active a to year experience careous material remains. After a 10 year experience most desolution techniques have been disappointing The author has had opportunity to try appointing and section with intense Vitamin A feed ing diets, and drugs. Continuous or rapidly repeated irrigation of stone-bearing and frequently infected kidneys with nephrostomy tubes nephros tomy tubes above and ureteral catheters below tidal irrigators Y tube irrigators, and hand syringe techniques have been used. They are time-con suming and sooner or later lead to renal irritation fever and urosepsis. After all of them were tried the use of the simple Y tube irrigator controlled by the patient with a No 10F indwelling catheter has seemed as good a method as any Tidal irrigators do not work in the renal pelvis with the Munro Nesbit Webb, Suby or other setup At best, any irrigator must be attached for a number of days or possibly

When possible stones should be removed sur gically or cystoscopically Residual material or

rapidly reforming calcification may be removed by irrigation Of the solvents, Suby's solution G is perhaps the best although it too has been only

As stated above soft calcareous material and at rarely successful times, softer stones can be dissolved. Hard dense calculi of any composition, and especially those with lamination the oxalate and urate stones, defy dissolution by any method used at present. The dan gers of unnary acidification especially when produced and maintained over long periods of time with ammonium chloride and nitrate are well known This procedure may even cause stone formation to become more intense. It is therefore the author's practice to apply stone dissolution techniques for a short period of two or three weeks. If they are not

well tolerated the regimen is stopped The author concludes that our present approaches to stone dissolution are unsatisfactory and the im nedate future does not look particularly promising For this reason, dense calculi those of oxalate and urate composition had better be removed sur gically if possible Efforts at eradication of non removable calculous material should be approached most conservatively with dissolution techniques. Efforts at dissolution of irremovable stones, such as bilateral staghorn calculi which cannot be success fully attacked by the improved extended pyelotomy

techniques will rarely be successful JOSEPH K NARAT M D

### SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Sineldon, W. H., Thebaut B. R., Hayman A. and Wall, M. J.: Osteomyellist Caused by Granu lorm Inguinale Report of a Case with Guitt vation of the Denovan Body in the Yolk Sec of the Developing Chick Embryo. Am. J. M. Sc. 945 21 237

During the past year acceral cases of systemic besemination of granuloma inguinale have been rely reted. In this article the authors present the history of a patient in whom hematogenous dissemination of the disease seems to be certain.

Any year old colored male was admitted to the hospital complianing of pain and exhibiting a large discretion on his left key. His past history revealed that he had had a trethral discharge so years previously. This was associated with an in gunual bubo which eventually ruptured and drained for a while. Also about 18 years previously he had an ulcer near the firmulum which healed without treatment. At no time had serologic tests been made, nor had he received any treatment for syphilis.

On admission to the hospital the patient stated that about 6 months earlier he had struck his left shin against a heavy object. The leg was bruised and would not heal. Three months later he injured the same area a d an uleer developed. A month



1 Ity The large grandomatous lesion of the left leg Not the deep letration near the upper edge of the lesion which extended into the marrow cavity of the tibla.

later the left knee became stiff. Five weeks later a penille lesion was noticed by the patient for the fartime. It comsisted of a small erosion on the dorso of the penis adjacent to the corona. He further stated that he had lost 45 pounds in weight is the last six months.

The examination showed an elevated gramimations lesion measuring 7 by 15 cm on upper third of the left leg. A second bund-saged upper third of the left leg. A second bund-saged to the legislation of the legislation of the constant of the peak legislation of the constant there were no lymph nodes pulpable in the left ingular region. Some enlarged nodes were found at the right groun. The laboratory findings were semal except for the sedimentation rate (125 man pehour) serum alkaline phesphatase (A8 Rodanium); positive Ducrey and tuberculin tests, as negative Kasha and Frei tests.

A lytic bone defect measuring about 4 cm, is diameter was seen on the montgroupgmen of the this at the level of the tibial tubercle. The lesion as surrounded by selectic bone. Roentgroupgman of the other bones were negative except for a cytisilesion measuring about 1 by 1 cm in the satisfaportion of the left rib. Blopsies from the granslate issue, bone, and bone marrow had the appearant of granuloma ingulante. Donovan bodies verinolated by inoculation of tissue material fits 4 chick embryo yolk sac following the technique & extibed by Anderson. Blopsy of the fib keson the not resemble granuloma inguinale on histologou sections

The treatment consisted of local application of ulfadiazine and tyrothridin Fuedin was sho ntramuscularly at weekly Intervals. The fibilities fect was packed with foodoring saure and the part ing wa changed at frequent 1 tervals. Applitude.



Fig. s Roentgroogram of left tibia, lateral and uniterposterior view. Large defect in the tibia with some extens of the nerrounding bone and irregular periostral thickests.

ness graft was applied to the lesson of the leg 90 per cent of the graft survived

Grosce 1 Rens, M.D

Salisacha, L. G: A Study of Periscapulohumeral Calcifications (Contribución al estudio de las cal cificacións periescipulohumerales) Cirag aper loconolor 1014 à 210

Periscapulohumeral calcufications are an ana tomical form of the penarthritis described by Duplay They may be acute or chronic. In both the acute and chronic forms the symptoms are pain and rigid ity of the shoulder In some cases there are no symptoms at all. These calcifications are generally located in the subdeltoid and subacromial serous bursae or in the tendon of the supraspinatus muscle the latter localization being the most frequent. They consist essentially of a local calcification caused by an inflammation of the serous bursae which may be due to syphilis or rheumatism or by necrosis of the tendon due to trauma. There is rarely if ever a single severe trauma but usually rather slight and frequently repeated postural or occupational mini mal trauma due to punching of the tendon of the supraspinatus muscle between the head of the hu merus and the acromiocoracoid process.

The treatment of these calcifications is the same as that of the other forms of sampulonumeral peri arthrita. The treatment of choice is infiltration of the stellate ganglion with an anesthetic the author has had good results from the infiltration of percanne followed by the injection of from z to z c. of a 1 too solution of novocatin. Physical methods such as disthermy infra red rays, radiotherapy and mechanotherapy may be used as adjuvant treat ments. If infiltration of the stellate ganglion fails, which has never occurred in the suthor's experience, forced mobilization should be carried out under scuetchers. Surgical operation is rarely indicated.

The literature on the subject is reviewed and histories and roentgenograms of 7 cases are given.

AUDREY G MORGAN, M.D.

### BURGERY OF THE BONES, JOINTS MUSCLES, TENDONS, ETC

Hellstadius, A.: Bone Chip" Grafts in Defects of the Long Bones. Acta chir mand., 1944, 90 317

In some cases of bone transplantation the use of bone chips has proved better than the use of a single large bone graft. For instance, in Albees operation for toberculous spondylitis some surgeons have used bone chips in place of the single transplant. Matti believes that the bone chips are more relatant than the large graft to infection in the field of operation.

In this article experiments on rabbits are described in which chips of compact bone (with the endosteum and perioateum) were placed in a defect in the disphysis of one radius while chips from spongy bone substance were placed in a corresponding defect in the disphysis of the other radius. On the side on which compact bone was used new bone was formed more quickly and in larger amounts than on the side on which spongy substance was used and the differentiation of marrow and cortex took place more

In some cases the soft parts around the bone showed a tendency to grow in between the spongy bone transplants. It would seem, therefore that chips from compact bone are preferable to those from spongy substance in repairing defects in the long bones

Matri advocated the use of chips of spongy substance in these cases as he said that the bone cells in the spongy grafts survive while these in the compact grafts do not. This opinion was not confirmed in these experiments.

Further experiments were made to determine the relative value of chips of cortex freed from periosteum and endosteum and chips in which the periosteum and endosteum were retained Graits of this kind were inserted into defects in the radius and also into the soft parts around the home. The experiments showed that new hone is formed more residily when the periosteum and endosteum are retained ACREST GRIGAGOM M D

### Oldfield, M. C.: Hisc Hernis after Bone Grafting Laucet Lond., 1945 248 810

On 56 occasions, bone grafts taken from the illum were used in the repair of defects of the face and wkull One patient developed a landalide type of hemis of the excum into the donor site. When the patient was standing a protrusion was noticed in the right flank. The hemis was easily reducible. The hemis orifice was about 1½ inches in diameter and the protruding excum measured about 3½ inches in its greatest diameter. Repair was done under spinal anesthesis and fascial sutures were used. The fascial strip was taken from the right thigh by means of a Masson s fasciotoms.

The patient was kept in bed for a period of 4 weeks, and during the last 2 weeks graduated abdominal muscle exercises were done. He returned to work and suffered no disability.

Ground L Renes, M.D.

### Strange F G S: The Major Amputation Stump in Health and Disease Brit. J Surg., 1945 33 31

The ideal amputation stump is regarded by the author as a smoothly contoured and somewhat ta penng cone, well balanced, powerful, with full range of movement, and well re-educated muscles and of ideal length (as recently described by Kelham and Perkins—Amputations and Artificial Limbs London Oxford Univ Press 1943) The skin over this stump should be sough fitting undertaid with its own deep fascia healthy and meeting at a mobile, linear and usually terminal scar.

These requisites will best be attained by the avoidance of trauma at operation, all structures being simply cut through and not subjected to crushing or injections of alcohol as was formerly

done in the case of the large nerve trunks. However a densely adherent nerve end bulb is not necessarily a painful one. The periosteum is cut through level with the bone end. This is almost invariably the site of a spur which must be recognized as a normal constituent of an amputation stump

Avoldance of infection has also been given much thought however of all the operations designed to heal by first intention, amputation fails most often. Of the 406 cases forming the basis of this report, 232 (57 1%) suppurated for a shorter or longer period before healing and this included 70 consec utive cases treated by the author himself with primany healing in 63 (80%) In a clean case, such as the reamputation in which operation can be delayed for several weeks primary auture is permissible. It may also be used in the presence of a septic process. when this process is comparatively remote from the intended site of amputation, when it is of long standing, or when it has not yet developed completely If however at the time of removal of the tube in 48 hours, there is evidence of infection, the wound must be reopened and the flaps turned back. The delayed suture technique of Jack and Charnley (British Orthopaedic Association Heeting Rochampton, 1011 2 111) is mentioned as an improvement-15 cases healed by first intention, 14 healed with soft tussue infection only, and 3 cases presented severe infections—but still it fell short of the ideal result sought. Secondary suture is performed after 14 days of open drainage of the amputation wound.

There remains, however a proportion of cases in which the infectious process is too close to o acute for any reasonable hope of primary healing following the use of any of the described methods. In these cases the first aid is amputation is applicable this is a very low amputation in which some degree of infection is expected, but which allows plenty of room for reamputation, when the sepah has been controlled. The remaining method is the guillotine amputation, which because of the lack of laps can be carried out very close to the lexical if necessary and thus allows as much room as possible for sub-

sequent reconstruction. The postoperative management of all the amputations, except the guillotine, was the same that is, a drainage tube and gause dressing with tight elastic bandage enveloping the entire stump, were used, and a posterior or other spilat was applied for 1s days to forestall subsequent flexion contractures. The drain was removed after 48 hours, and the sutures on the twelfth day no daily dressings, probing or squeezing were resorted to for removal of the hematoms. Nonresistance exercises were begun after 1s days and resistance exercises after 3% weeks. The stump was ready for limb-bearing after from 4 to 6 weeks.

In the guillotine type of amputation a Bunyan Stannard envelope (Brit Med J 1941 s 1) has applied and after irrigation with hypochlorite, light akin traction in a Thomas kine splint or Jones humerus extension splint is used on occasion a Thierach

graft is applied as soon as the bone end is covered by granulations. This method is applicable to the stump which breaks down and leaves an open wound. The striking thing about the Theodograft is that it often shrinks down to wher it say later be excised with subsequent approximation of the previously nonapproximating skie edge.

In the author's material (400 cases) there were to camputations these operations are indicated by completion of the two-stage ampotations for certainty and other than the completion of the two-stage ampotations for certainty and the completion of the completion of the cases when there is not enough skin to allow excitate and auture, and when there is no summy internated to the vascular type However these operations should be a complete to the completion of the completion of the completion of an open wound is a violation of the basic principles of surgery and cannot be condended even when associated with the use of the sulformation of penicillin of the condended completion of the condended completion of the completion of th

### PRACTURES AND DISLOCATIONS

### Soto-Half R.: Fractures of the Carpal Scapboll. J Am M Ass 1945, 189 235.

The treatment of recent fractures of the card scaphold is almost a solved problem, as hat less abown by the many studies of end-results in the latfew years however the author believes that to many surgeous fall, either because they are not vigiant in noting and following the most minute detail in diagnosis and treatment or because they captiment with methods which are not founded on sould anatomic principles.

Fractures of this type must be diagnosed immedately after the injury and fallure to do so is occor

the main causes of nonunion.

The history of a fall on the outstretched insi, tenderness in the anatomic souffbox, and pain at the point on percussion of the fully extended thrus should be almost conclusive evidence. Should the initial noentgenogram fall to show the frastur, be clinical findings should be used as presumptive tidence, and the only course to be followed in instellulation of the wrist for a period of y weeks. After this should radiographic studies again be negative, the patient a ligamentous injury will have been helped by rest, and if as so often happens the fibs show a bone injury be is already started in the

proper path of healing.
Certain precautions in taking roentgenograms are desirable. For careful companson with the emisjared wits, lateral views about be taken with the twarsts in the same position, and this can best is attained by putting the paints together with the fingers pointing forward in a "graying position. The porterosineror views must always be taken is complete ulars feerion, as in this position the log complete ulars feerion, as in this position the log axis of the exception is visible and at least two obliques are needed to complete the study, with the painter and downs jurifaces of the wrist alternative ment to the plate. Fractures involving a small part



Fig. 1 Experimentally produced fracture of the carpal scapedd in a cadaver. A wire has been threaded through the flacor politics longus trodon. These views show the intensite relationship of this tendon to the scaphoid; particularly to the area of the tubertle. In three specimens any novement of the interphalangeal joint of the thumb produces a definite change of poution of the fractured fragments. The tendon passes beneath the transverse captal bigment and enters the oscoroponeurotic canal, of which the scaphoid is a wall then passes distally to be inserted in the distal phalans of the thumb. Note that in the anteropotection view the fracture is not visible whereas in the oblance view it is readily seen.

of the proximal pole should be differentiated because in this type the blood supply is poorest and the prognosis therefore is least favorable.

Fracture of the tubercle offers little difficulty since the bone in this area is covered by pernosteum and is well vascularized. This is a rare belon. Full bealing should take place in from 3 to 4 weeks by simple immobilization of the wrist.

In the treatment of fractures through the body the first step should be to determine accurately whether any displacement is present. The lateral film should be carefully studied for angulation. In the presence of displacement reduction can be obtained by traction on the thumb while the smufflow modified by the surgeon singers. Once alignment has been attained, the fragments can be impacted and properly immobilized by placing the writt in full radial fieldom with from 20 to 3 degrees dorsi fexion and pressing the base of the thumb just below its providual crasse into full adduction

Proper immobilization of the thumb is important became by its inclusion more complete fixation of the wrist can be attained and any active movement of the thumb involves the long fieror tendon and the abductor politics which, by its intimate relation shap with the scapbold produces motion of the fragments.

Care must be taken to force the thumb into abduction at its base rather than at its tip since the latter procedure leads either to strain or to subluxation of the metacarpophalangeal joint. In this strained position recovery of function takes place much more slowly. The metacarpai therefore should be abducted and the thumb relaxed in slight flexion.

An anterior skin-tight plaster splint is first applied and then one layer of circular flannel bandage is wrapped around the extremity This is followed by



Fig. 2 Two viers Blustrather maneurer for manipulating the wrist into correct position of full radial flexion so to 30 degrees dorifflexion of the wrist with the base of the thumb in full abduction but its metacarpophalangeal and interphalangeal joints relaxed in slight flexion, the heel of the physician's hard pressing again t the heel of the patient's hand.

a circular plaster splint. It is important that the plaster be carried as close to the elbow as possible and still allow full flexion of this joint and as previously mentioned the plaster should extend to the middle of the thumb nail and to the metacurpopha langual joint of the fingers. Mobilization of this area in scaphoid fractures will not produce the stiffness one always notes following Colles fractures.

Immobilization should be complete and undistrated for at least 9 or 10 weeks a large percentage of fractures will heal in this time but a penod of from 4 to 5 weeks longer may be necessary. Reent genograms and clinical examinations should determine whether this further immobilization is dear able. The presence of local tenderness in the ana tomic saufibox, or pain on percussion on the tip of the thumb associated with inconclusive radiological evidence of union should warrant further immobilization. Sometimes the clinical evidence of union will appear before it is demonstrated in the roent genogram.

"Certain authors have recommended prolonged immobilization sometimes as long as from 12 to 18 months. The author does not concur with this policy, because 95 per cent of fractures will have united in from 4 to 5 months and when union is delayed beyond that time there are certain complications which should be treated surgically rather than by further splinting. These are malposition of the fractures interposition of strong brows bands asceptic necrosis or an uncontrolled very small fracture of the proximal pole. In the latter injury in which only one-sixth of the scaphoid is involved an excision of the small fragment (If three months splinting fails) results in better function than very prolonged immobilization.

When fractures of the scaphoid are associated with luxation of the semilunar bone, which occurs in about 12 per cent of the cases, the wrist must of necessity be held in alight volar flexion for the first 4 weeks. If it is placed in dorsiflexion in order to treat the scapboid fracture the semilunar may ROBERT P MONTOCKERY M D redulocate

Pendergrass, E. P., and Lafferty J O : Rosnitten Study of the Ankle in Severe Sprains and Dislocations. Redielegy 1945 45 40.

Usually the interpretation of roentgenograms of the ankle is confined to the diagnosis of bone or cartilage lesions because it is based only on anatomical observations. The present article represents an attempt to employ roentgenography for the dung nosis of soft timue lesions of the ankle by taking into consideration the physiology of this joint.

The authors noticed that multiple roentgenograms of a recently severely sprained ankle which was manipulated into different positions on the raying table showed an abnormal lateral rotatory mobility of the talus and a tendency of the talotibial foint to subluxate, whereas films of 6 normal ankles failed to demonstrate this phenomenon. After four weeks of immobilization this abnormality could no longer be demonstrated. (The case was complicated by an old ununited fracture of the in ternal malleolus which was thought not to have any bearing on this observation)

The authors come to the conclusion that in cases in which conventional anteroposterior and lateral films of the ankle in neutral position fail to show any bone lesion, additional anterocosterior films should be taken with the foot held in forced inversion and eversion as well as in flexion and extension. This type of filming is also recommended for cases of recurrent painless ankle sprain, instability of the ankle, abnormal mobility of the ankle joint with a depression in front of the external malleolus and for cases which are to be given procuine injection treat ments The purpose of this examination is to demonstrate a tear or extreme stretching of the entire external lateral ligament, or at least of its anterior and middle fascicles. In simple sprains only the anterior fascicle is involved according to Elmslie No x-ray findings are then to be expected.

Permission for the manipulation of the ankle necessary for this type of filming should be obtained from the referring physician. The injection of from 5 to 10 c.c. of proceine around the point of maximal tenderness prior to the examination is suggested for painful cases. GERHART S. SCHWARZ, M.D.

Cano, L. S., and Valdée, E. R.: Mechanical and Biological Problems in Nailing the Marrow of Fractured Bones by Kuantscher's Method (Los problemas mecánicos y biológicos del enciavijamiento modular de Kuentscher) Cirug aper lecemeter

The history of the method of inserting metal nails or pers into the marrow cavity in fractures of the long bones is reviewed. Various metals were tried but in 1940 Kuentscher described his method of reing \-shaped inserts of stainless steel, which stees to be the best method so far devised. With the me of this metal there is no corresion and immobilization

is so complete that the use of planter is not necessary This method fulfills the three requirements in the treatment of fracture that the fragments be at curately reduced that they be immobilized in good position until consolidation takes place, and that the muscles and joints be exercised as much as possible during the immobilization of the insyments. It has been found that the presence of a large foreign both in the marrow cavity is tolerated very well and that the pressure exercised by the nail further calls formation. The marrow itself also plays a part but not the predominant part, in callus formation. Calhas formation takes place for the most part from metaplasia of connective tissue. The presence of the nail may stimulate callus formation by a process of chemical irritation and by stimulation of phonestase production, although the authors have not been able to demonstrate the latter

The blood picture usually shows a more or less marked eccinophilis and an increase of reticulocytes for some days after the insertion and removal of the nail. Experimental work has shown that some in passes into the lungs but not enough to endanger the life of the patient. Infection is rare in these care

and when it occurs, it is mild.

The chief indication for the use of this method a in simple fractures of the diaphysis of the female, especially in elderly patients in whom continues extension or plaster casts are dangerous. It is also very useful in corrective esteotomies, in victority consolidated fractures, and malformations of the joints. It is not so definitely indicated in compound iractures, gunshot fractures, and fractures of the tibia, humerus and forearm.

Thirteen cases treated by the authors are dicussed, 6 being simple fractures of the femur 1 s pathological fracture of the femur from metastatic carcinoms, 3 simple fractures of the tible, 1 a conpound fracture of the tibia, 1 a pseudarthrons of the humerus, and 1 a pseudarthrosis of the radius AUDREY G. MORGER, M.D.

Rodrigues, F. D: The Surgical Treatment of Pathological Fractures (Tratamiento quincipo de las fracturas patologicas) Res. 11/22. Cl

brames vertes 1044 13: 17

When fragility of bones is due to general cause and the whole skeletal system is involved the trest ment is chiefly medical, but when bone disease a caused by localized infections or cysts the resulted fractures can be treated surgically. In such case there is a localized rarefaction of bone and always a deficiency of protein. One of the principles of trest ment is to remove the periosteum, together wal fragments of cortex, of a normal part of the book, and add these fragments to the blood dot which has formed at the site of the fracture. This provides a medium for fixing the calcium phosphates and initiating regeneration of bone. Blood calcium is an im

portant factor in osteogenesis

Two cases are described the first in a young woman who suffered a fracture of the middle third of the left humerus merely from her husband taking her arm. The bone could be doubled back on itself at the site of the fracture without any pain. The roentgenogram suggested hydatid cyst and this disgnosis was confirmed by biological tests. The cyst was destroyed by surgery and for some days destruction of the parametes was continued chemical ly by means of a mild solution of formel introduced into the marrow cavity of both fragments through drama. When all the echinococci were thought to be destroyed hyperemic treatment was begun with short waves hot fomentations and Bier's pasave congestion. During the days that this treat ment was given the site of the lesion was irrigated daily with rivanol solution to maintain an acid reaction. When the roentgen and clinical pictures sug gested that osteogenesis had begun, an alkaline solution was substituted for the acid one. (Mineral uation of the protein substance is best brought about m an acid medium ) When osteogenesis was at its height a plaster cast was applied and the patient sent home. After 6 months she returned with a completely consolidated fracture and good function of the arm but the bone had healed in a victous position.

The second case was that of a young git is years of age with a cyst which was caused by localized ostellia. This case was treated by the insertion of a sail into the marrow cavity of the two fragments (Kuentscher's method). The fracture was in the apper third of the femur. Fixation was perfect and

after a week the patient could move the joint, and after 25 days she was able to get up and walk. This treatment avoided the muscle atrophy and rigidity of the joint which is sometimes caused by prolonged

The article is illustrated with roentgenograms of both cases and photographs of the second patient showing the excellent results of treatment

AUDREY G MORGAN M.D.

#### ORTHOPEDICS IN GENERAL

Herz, R.: Herniation of Fascial Fat and Low Back Pain J Am M Ass 1945 128 931

The author reports the cases of 6 female patients with low back pain who recovered completely following the removal of a tumor in the low back region. The tumor consisted of a fat hernia through the superficial fasca in the lumbar and gluteal areas. In most instances histological examination of the excised fatty mass revealed fat lobules and some fibrons tissue. The blood versels showed penvascu lar proliferation, thickened walls and congestion.

In many of the cases several nodes were palpable in the lower back region. Injection of a per cent novocain into the small, hard masses allowated the low back pain. Some patients complained of pain in the left or right leg, associated with the low back pain and this pain also disappeared when the novocain injected into the nodes had localized in the low back region. All patients who responded favorably to the local injection of novocain had complete re lief after the nodes had been exceed.

Copeman and Ackerman report similar findings in 14 soldiers with back pain

GEORGE L REISS, M D

### SURGERY OF THE BLOOD AND LYMPH SYSTEMS

#### BLOOD VESSELS

Crafoord G., and Sylin, G.: Confenits Coarcta tion of the Aorta and its Surgical Treatment J. Therac Surg. 1945, 14, 347

It was d monstrated by one I the authors in an rpermental study in dogs that the flow [13] I to all the organs could remain suspended fir as long a twenty to thirty minutes without any ubsequent sign of organic damage sepredul an all quate first th Iran wa secured. This circula tion to the brain wa maintained by er ating and tomoves bett een the carotilan liquids ver I of an animal of the ame use. On the strength of this observation Craf el in certain patient with a patent lucturarter nu to kther kofplacing clampf r cein a the a read ve as I below th 1 int of atry I the duct int the artery and I keep ng them at tached during the time neces ary to five te the duct nd uture th sorts. Although in ne of the pa tient this part I the operation took at minutes to perform n n ticrable i turbances were of cered in

the patient internal organ.

The quests names a to whether it might not be possible to triat congenital coarce ten fother rife ithmusty urgical mean. Coarctainmof the arts.

a fairly commen also smalles and knowledge of the congenital of a mity hal accumulate thin the last few lecades. The appendights been kind was for nearly 200 years. In her classical work on congenital car discover of congenital cardowayeash of decimental cardowayeash of one cases of congenital cardowayeash of decimental cardowayeash of congenital cardowayeash of decimental cardowayeash of decimen

The constrict in the art a piculared just be a worst be incertision of the duct scatterious. The narrowing may be very slight or their may be complete obstruction of the acits. The acits is not as ally flated abo with contribution but the part ally flated abo with contribution but the part proximal t the obstruction may be this valled and hey pila tie. The determiny is often associated with the proximal transfer of the deformity is often associated with other cardons cubra anomalies such as blesspidiated to valves. Anomalies of the acritic arch are frequently found.

Currial in of the aorta in its classical I m is called the called

The authors report 2 cases one of a 12 year 1d bo) and the other of a 27 year old farmer both of whom were operated on to relieve congraind our tation of the a ria. The defail of the Enfing before and after the peration are presented. In with patient the a ris showed cooled nature lighters the origin of the subclavian artery and the coolcountriction between the contration and the past of stip partner of the subclavian artery was small lower in the burythin in the farmer.

It is remarkal! that in it he ases normal one? It is re-stallighted them lives regarding the l! of pressure so that in both cases the blood pressure the lees was a little higher than in the arms on a bequet in low in way present. This postoperate off cits of consideral le interest and is in favor of the mechanical theory. Physical is no in contrattien

If se of Terretor MD

Agar II., Rewlands, J., and Oglisle W. II.: Arterial Ancurrent following Indusy to Illac Vencia. Col. II. J. 1915. 1. 451

The a cases top it. I by the auth is are carpide of art rul ancurrom I II white wards. Learn case. I patter I more than one like artry in neces my. The operations were accompanied by profuse and rapid homorrhage to combit what profuse and rapid trainful ion was necessary. Recovery was undoubteful does to the promptions and completeness with which the blood los was rate good.

In each of three patient, the surgeon was fared, during the course of the operation, with hemorrhar at a rate with which translation could not peakly keep pace and the only way in which an innerdate fatal issue outly be avoided was by the application of a temporary packing and interruption of the operation until the circulatt ry volume had been

rest red to a reax nable level.

Deta bed clinical histories and the findings in the cases are presented—an aneutysm of the buttock is the first patient and a retroperitional amergym is the second patient. In the first case 14 pitts of blood and 4 pitts of plasma were given during the operation and a total of 27 pints was given during the first 4 days, from which there was no reactiva.

In commenting the authors note that in the ore case in which both internal line arteries were telthe pelvic organs which should have suffered markmum deprivation did not reveal evidences of dam age. The heel, supplied by the external flux artery which was not tied showed arterial gangrene

In the second case the nutration of the limbs never seemed to be in danger even though not merely all the iliac arteries but the epigastric anastomosis which forms the most obvious collateral channel had been tied. The details of the operation for the re pair of the retroperatoneal aneurysm are presented

The authors note further that one of the most striking advances in surgery during the last 4 years is the progress that has been made in the use of whole blood. The advantages of an adequate blood bank for needed massive transfusions are pointed out and described. While blood transfusion undoubtedly has its dangers these dangers are assocated with the giving of blood to those who are gravely ill and who have been repeatedly transfused over a long period Blood from a blood bank, properly prepared and given seems to have no dangers in the type of massive post traumatic hemorrhage in which it offers the only means of saving life. HERBERT F THURSTON M.D.

Zukerman, C. M : Thrombophiebitis of the Cubital Veins in Blood Donors. West J Surg 1945 53

Among approximately 285 000 venepunctures per formed at the Blood Donor Center Chicago Illi nois, there was found to occur 12 cases of thrombophlebitis in the cubital veins following venesection Of these ir were in females and r in a male. The most important predisposing factors are listed as tranma to the vem wall and slowing of the blood flow by means of (a) the application of a circular bandage (b) hematoma, (c) systemic reaction (d) acute flexion of the forearm or straining of the arm during exercise following venepuncture.

Duability following thrombophlebitis of the cubi tal veins averaged approximately 4 months.

The best preventive measures are listed as follows

Careful venepuncture technique. The immediate discontinuance of the bleeding

il a hematoma develops or if the donor complains that the needle causes discomfort 3 Preventing the donor from flexing his foresrm

after venepuncture.

4 A circular bandage should not be applied as a dressing

Eight of the donors mentioned had given blood for the first time and 4 were repeat donors 7 of the donors developed hematoma 5 donors were bled at the Fixed Center and 7 were cared for on the Mobile

The author presents a table giving the essential data on the 12 donors who developed thrombophle RESEARD J BEDDETT JR., M.D.

Silbert, S: Thromboanglitia Obliterans. J Am M Ass 1945 119 5

The criteria for the differential diagnosis between thromboanglitis and arteriosclerosis in patients between 40 and 50 years of age are given as follows Thromboangiltis obliterans

Patient appears younger than his are Hair normally pigmented

No arcus seniirs Retinal arteries normal

Blood pressure usually low

Radial and temporal vessels soft Upper extremities frequently involved

Femoral arteries frequently closed No calcification of vessels on x ray examination Blood volume usually diminished

Symptoms of coronary artery sclerosis rare Aorta appears normal on x ray examination Albuminuria rare

History of migrating phlebitis frequent

Arteriosclerosis

Patient appears older than his age

Hair usually gray Arcus senilis frequently present

Retinal arteries usually sclerotic Blood pressure often high Radial and temporal vessels thickened and hard

Upper extremities seldom involved

Femoral arteries seldom closed Calcification of vessels on x ray examination

frequently seen

Blood volume usually normal Symptoms of coronary artery sciencesis frequent

Aorts sometimes appears elongated on x ray examination

Albuminuria not uncommon History of migrating phiebitis rare

One hundred patients with thromboangiltis obliterans have been followed up for more than 10 years. All of them stopped smoking at the begin

ning of treatment and have not resumed since. In all of the patients the disease has remained completely arrested following the initial period of

Thromboanmitis obliterans is caused by smoking in individuals constitutionally sensitive to tobacco JOHN J MALONEY M.D.

Chapman E. M., and Linton R. R.: Mode of Production of Pulmonary Embeli J Am M Att 1945 129 196.

The authors believe that acts of straining such as holding the breath in inspiration and making an expiratory effort with the glottes closed especially by those confined to bed from illness or operation com monly result in sudden and often fatal pulmonary embolus

The dramatic plugging of the pulmonary arteries by clots released from the leg veins after straining on s bedpan has been witnessed probably more often by nurses than by doctors

There is a rise of several centimeters in the arm vein pressure during the forced expiratory effort with the glottis closed. The difference between this reading and the reading in the leg when the patient is recumbent is probably due to the fact that the venous reservoir drained by the superior vena cava is much smaller and more subject to prec ure by muscles and other structures. However when the patical to sitting in the bedpan position there is a great rise in the normal venous pressure in the log (hydrostatic effect) and this in turn shows a greater in

crease on forced expiratory effort

The release I mural thrombit that so often lie in the leg vitus is due to the fact that the version pressure and volume in the leg rise sharply during I reed expiratory effort with the glottic detect. A consider with that is in the version pressure there is a temporary impeding of the return of the blood to the heart, so that the perspherial veries become distended with blood, and this may bosen an insecurely at tached mural thrombins. With the drop in wen as pressure during the next inspiration, the diamond remous Hood rapidly empires from the perspheral cuts was hing with it any loosely attached throm but.

Strenge Carmer & Davies Hood.

### Hampton, A. O., Prandoni, A. G., and King, J. T.; Pulmonary, Embolism from Obscure Sources, Ball J. A.; Heft as H. J. 1915, 70, 245

Ten cases are reported in which acute chest con ditions appeared to have been caused by pulmonary embolism, with or without infarction. The emboli-originated from various venous sources in ambula tory active industrials. Careful examination falled to show any signs of heart disease or of sascular dis order prior t the first embolic epical with one except in In 3 patients the source of embel m never became clear. No specific common I nomi nator that could reasonably be suppored to have caused phlebothrombosis and emboli in was el cited There were 8 army o seem in the group, which sig gests that exertion may be a factor. At the time of admit ion there was no ob ious a.gn of venous thrombouls except in one patient who had a throm bosed hemorrhoid. Accurate diagnosis in such cases is exceedingly difficult at the onset and none of the nationts was admitted with a correct disensels. One was thought to have primary atypical pneumonia s pericanditis with effu ion a ruptured peptic ulcer s metastatic carcinoma of the lung s angina pect if and a were thought to have coronary oc dution.

Roratgenograms of the chest are not very helpful at the most since the shadow of infartion does not develop until a day or two have clayed. In general dymnes, was more prominent than pain. A full pain in the base of the neck or in a shoulder followed by pain in the arilla, should suggest polinomary embodism. Elevation of the temperature within the entry four hours of the first symptom is more suggestive of embodism than of coronary occursion. Blood apit ting occurs in less than half of the cases and then, only after infartion has occurred. The most office undifferentiation is between embodism from a silent peripheral source and embol in from myocardial infarction. Serial electrocardiograms and philebograms undiff selectioned the diagnosis. The authors

found phlebograms very helpful in the diagnoss act had no serious revults from the procedure. Critical for the interpretation of phlebograms, reculpedgrams, and electrocardiograms are recorded.

The treatment consisted of heparin and diemarianticoagulant therapy plus rest and elevation of the part affected by thrombosis or phiebitis.

JOHN L. LINDSON M.D.

### Golodner H., Morse L. J., and Angrist, A.: Polmonary Embolism in Fractures of the life Surgery 1915, 18 418.

Apatient who after a fracture of his hip resents sheal conduit on I r the divelopment of worst thrombi in the lower extremition. The bood turns is all well by the complete voluntary immediates of the extremities to avoid pointful movements at the fracture site by the avoneath effect avoneanth of the limited of the interval of the fracture and by the impaired culturated by the fracture and by the impaired culturated that and the ina lequal peripheral carolities in the sared group. Concomitantly charges in the chemical comp site of the blood conductry to

chemical comprosits of the blood conductor to thrombos I must a result from the henritin of to the ferments by the laterated muscles I gazera, and I not at the fracture sites. Initial disrupt or curring when the patient is bedind fen it enhanced with a prices of White boots are utilized beared of the greater persone exerted against the cult win by those play after of I an encuement.

The most dangerous type is the "philebithmens or silent propagating thrombes becare klack local you're and therefore a present are no fertilent. This includes after propagating wroost thrombes was predominant in Goldmens that propagating the presence of or partiest part any appropriate fertile it the presence of venoes thrombes in the lower attenuity. Yet a rule some effort motion discharged the fault pulmonary embolies in a use it was many ultime reduction in the operating room in months, turn for of the patient from as bed to a wheel dark in others turn age the patient from one side to the ther in bed. Beaths occurred as early as the side are and a site as it he seventited thay following

n lary. The occurrence of venoes thrombosis and rebolium is less frequent in patients who are rake ambulant early and prophytactic biat rail sperficial I moral wein ligation comblored with herbar asympathetic block is suggested as being most kind for the prevention of polimonary embodism in features of the hip especially in those who cannot be made ambulant early. Sersence A Zerus ILD.

Gaston E. A., and Folson II: Ligation of the Inferior Vena Cava for the Prevention of Folmonary Embolism \ F find J M 1935 33 179.

The literature on vein lig tion for the percention of pulmonary embolism is reviewed. Femoral vehand common filize vein ligations are discussed Ligation of the interior vena cura seems definable, first to interrupt the venous channel above the effective of the common channel above the effective common channel common channel common channel common common channel com

dent femorolliac thrombosis and second to prevent embolism from a simultaneous subclinical phiebothrombosis that is frequently present in the veins of

Although it seems evident in a great majority of cases that pulmonary embolism arises from venous thrombosis originating in the vein of the lower legs and later progressing upward to involve the pelvic reins there are some cases in which the thrombotic process arises in the pelvic veins themselves

Numerous reports of experimental rapid occlu sion of the inferior vena cava by ligation have been published, beginning with the work of Lower in 1669. It has been repeatedly and conclusively shown that ligation above the level of the renal veins results in death, mustly with accompanying anuria and nremia. Below the level of the renal veins experi mental ligation of the inferior vens cave is com patible with life carnes a low mortality rate and is associated with only slight and transient edema of the lower extremities

The authors have reviewed clinical reports of in ferior vena cava ligation in man and state that li gation of the inferior vena cava below the level of the renal veins although an operation of comiderable magnitude is compatible with survival in both ex

Two cases are presented to illustrate situations in which an operation was followed by recovery the time of caval ligation both patients had suffered multiple pulmonary infarcts Both had had previous common femoral vein ligation, bilateral in the first case and on one side only in the second case Caval vein hgation was performed under apinal anesthesia supplemented by sodium pentothal in one case through a right rectus incision. The inferior vens cays was ligated in continuity with two nonabsorbable sutures 1 cm. apart at the level of the bufur cation of the norta

Mottled cvance of both legs was noted immedi ately after operation followed by putting edema which came on in 4 hours However there was gradual subsidence of this and 4 months after opera tion there was no edema in the first case and only minimal edema of the left leg in the second case.

The following points are considered most helpful in sustaining the patient through the critical post operative period swathing the feet, legs and thighs statistic bandages to help prevent shock due to the rapid withdrawal of edema fluid from the cir culation the carry use of oxygen and adequate in travenous infusions of plasma and whole blood LUCIAN J FRONDUTI M.D.

## BLOOD TRANSFUSION

Britton C. J. C. and Warner C. P : Leucemoid Blood Reaction Simulating Acute Aleucemic concernia in a Case of Philegmonous Gastritis. Laxed Lond. 1945 249 430.

A case is reported wherein apparently the blood picture reaction to a phlegmonous gastritis so closely

resembled that of an acute aleucemic myeloblastic leucemin that the correct diagnosis was not made during life. The patient was a single woman aged 47 who developed a sore throat cold and tempera ture After five days of treatment with a sulfons mide (identity and dosage unknown) she vomited This illness was followed by weakness and an apy rexial symptomics period of about 10 days then the patient developed a high temperature headache and a slight cough drownness, slow cerebration pale mucous membranes and heavily coated tongue The liver was palpable 136 inches below the costal margin and soft glands could be felt in the posterior triangle of the neck and in the groin. At this time the blood picture exhibited a total white count of 3 700 with a paucity of polymorphs (5 5 %) and a arge number of myeloblasts or promonocytes (450 %) The lymphocytes amounted to 355 per cent there was only one normobiast but numerous platelets were found. Ten days later the blood ple ture showed a white count of 2 600 4 per cent of polymorphs 17 per cent of myeloblasts and 77 per cent of lymphocytes and 8 days later the picture was that of a leucopenia with 1,400 white cells with 8 per cent of polymorphs, 50 per cent of mycloblasts and 40 per cent of lymphocytes.

The patient did not at any time show material im provement in her condition under the picture of an anemia hyperpyrexia, weakness and mental confusion she died a month after the onset of the

Antopsy showed no evidence of leucemis in any organ. In the bone marrow there was a moderate increase in the erythroblastic and myeloid tissue but no myeloblastic reaction was noted. The most strik ing finding was an acute phlegmonous gastntis with niceration and gangrene low grade peritonitis and bronchopneumonia were also present.

Since the clinical findings all pointed to a diagnosis of acute aleucemic leucemia and the patient was obviously dying when she came under the authors attention, confirmation of the diagnosis by means of sternal puncture was not considered necessary and therefore the autopsy findings were a complete JOHN W BREMMAN M.D.

Thierach J B.: Attempted Transmission of Human Leucemia in Man. J Leb Clin. H 1945

Whereas in fowls and mice leucemia can readily be transmitted in susceptible strains and only a minimal amount (one leucemic cell) of leucemic material is necessary for a successful transmission all attempts of previous workers and the ones de scribed herewith to transmit this condition in man have falled. So far no transmission of leucemia from man to man, by means of blood, lymph nodule or spleen, has been established. The reason for this failure might be sought in the following factors

The lechnique employed The assumed leucemic gent might not be able to contact sufficient susceptible cells of its own type that is cells of the bone

marrow or lymph polules, by the subcutaneous or intravenous routes, which were employed for the attempted transmis ion. The agent of human leucemia might be extremely sen itive and mit sur

wive the procedure of tran mulion.

The material and Whole blood lymph nodules and spices might not be suitable for tran my sion in that they might lither contain no leggemic agent or

have it only in an inactive form

The time I be mut a The tim of observation in many ca es wa certainly ery short but even a months might n t be sufficient time for the agent to

restable hitself and produce a leucemla

The chest flatts \ \ \text{nly people with a life prospect of under two years | cre available and all suff r ed from incurable di cases, the reculents could nit be recarded as varginal organisms. These rations my ht ha had sur clent antil her to trevent a take

The recipient mucht also have had a natural in munity might have belonged to a consecrettle strain of man, or might have had an someted in munity which po tected him against any kurence

It also might be that human leucemia, contran is animal leucemia cannot be transmitted and then fore all attempt at transmi sion were useless from

the start

The fact that even material from acute lexcenawould not produce reactions in the recipients nemarkable as one would expect that this tire if leucemia with its fulminant course would be the ea lest to tran m t

Of all the factors mentioned, the difficulty of di taining uitable hosts and the apparently un stage rout wite the most important and might certahave been rest mills for the negati e results of the transmi ion attempts Be jeure Gribe MD

# SURGICAL TECHNIQUE

### OPERATIVE SURGERY AND TECHNIQUE POSTOPERATIVE TREATMENT

Fomon, S Luongo, R. Schattner A., and Turchik, F: Cancellous Bone Transplants for the Cor rection of Saddle Nose Ann Old Rhinel 1045

An ideal nasal transplant should be readily avail able in sufficient quantity and have a commetency that will permit easy modeling. It must resist in fection and absorption, be well tolerated by the trance, and not subject to change in shape after implantation. While a graft meeting all of these appendications is still being sought the authors be lieve that at present cancellous bone obtained from the ilium is the material of choice Next to cancel lous bone, cartilage is probably the most satisfactory material for nasal grafts but it has certain undeur able qualities not encountered in grafts of cancellous bone. It is prone to curl and its failure to form an organic union with the nasal bonca, to which it be comes united only by means of fibrous tissue fre quently leads to an unnatural mobility

In preparing for the operation a cast is made of the nasal defect and from this a stent is built up to the normal contour This model is sternized at the time of operation to aid in the shaping of the trans plant. The first step in the operation is the prepa ration of the bed which is to receive the transplant. A circumferential incision is made in the left vesti bule along the lower lateral cartilage and through this the soft tissues are separated from the dorsum of the nose. At the upper end the periosteum is undermined for the reception and immobilization of the tapered end of the proposed transplant. If a colu mellar strut is needed an incusion is made along one side of the membranous septum and through this a bed is made in the columnla between the two mesial

The surgeon and assistants then change gown and goves and freshly sterilized instruments are supplied to prevent cross-contamination as the transplant is obtained. The fluc crest is exposed through a curved incision and the perior term and a thin layer of cortical bone are then resected from the crest with a chisci and mallet. A piece of cancellous bone of appropriate size is then removed. To prerent splintering the graft is undercut with a thin broad chised first on one side and then on the other In an oblique manner so that the cuts will meet be heath the center of the graft at the required depth to attempt should be made to clevate the graft until it lies free in its bed. A motor driven saw is not recommended in this procedure because it is believed that the heat which it engenders tends to impair the viability of the bone.

The graft is then shaped in accordance with the pattern made from the cast The upper end is taper

ed to a thickness of from z to 2 mm. so that it will fit easily into the periosteal socket at the nasal root. The lower end is tapered to blend with the tip It is then inserted into the prepared bed. Any blanching of the skin over the graft indicates too great tension upon the surrounding soft parts and under such circumstances either the graft must be removed and made smaller or the soft tissues must be undercut sufficiently to assure tensionless reception of the transplant. The incision is closed with atraumatic sutures and the nose loosely packed with vaseline gause. The graft is held in position externally by narrow strips of adhesive tape applied around the tip and over the bony dorsum To protect the nose against traums and minimize postoperative edema a stent dressing is firmly applied and held in place

The authors have used cancellous bone for nasal grafts during the past three years and have found it far superior to other material used for this purpose JOSEPH J McDONALD M'D

Balley O T Ingraham, F D. Swenson O Low rey J J and Bering, E. A : Human Fibric and Bering, E. A.: Human Fibrin rey and being as a Hemostatic Agent in General Surgery Surgery 1945 18 347

This article records the findings and results of carefully planned experimental and clinical investigations, and the conclusions reached are based upon controlled pathological and clinical observations in a sufficient material.

In 5 monkeys, lacerated wounds of the liver were packed with fibrin foam with thrombin the wounds were sutured and examined at intervals of 30 min utes 4 hours and 21 70 and 74 days

In 4 monkeys a 1 cm. cube of fibrin foam soaked in human thrombin solution was inserted deep in a stab wound of the liver The wounds were sutured and examined after an interval of ir and 16 days, and 834 and 12 weeks. This procedure was repeated with the variation that sulfadiazine was used in conjunction with the hemostatic materials and the specimens were examined 8 days and 536 8 9 and 12 weeks later In another monkey this procedure was repeated except that a cube of fibrin form with thrombin that had been dipped in penicilin was placed in a second stab wound. This animal was sacrificed 34 days after the operation.

In 5 monkeys a cube of fibrin foam with thrombin was placed between the traumatized liver and the diaphragm and the animals were given an autops; usapiringm and the animals are given an autopsy-examination at 3 (2 animals) 456 8 and 13 weeks. This procedure was repeated with the variation that the fibrin foam, after soaking in thrombin was rolled in sulfadiazine powder and the autopsies were done at 536 8 (2 animals), 836 and 12 weeks

In 3 monkeys, which were sacrificed 3 7 and 14 days respectively after operation two stab wounds



cubic centimeter or higher. With intramuscular dosage, the a hour penicilin level is almost always design, the a nour pentity of the organism. Thus therapy may be ineffectual for a significant portion of the time between injections Besides, many pa tients do not tolerate fractional intramuscular in jections. The necessity for frequently repeated lajections will also interfere with the rest of the Datient.

The authors believe, therefore, that the fractional intramuscular method of penicilim administration can be recommended in the treatment of discase due to bacteria which are highly susceptible to the action of penicillin, and when the span of the treatment is relatively short as it is in gonorrhea and pneu

The method of continuous intramuscular infusion s technically simple Its maintenance causes serious complaint from the patient. The thigh muscles of the average patient were found to tolerate only 750 c.c. of solution per day More than this resulted in scute muscular soreness and necessitated discon innance of the infusion Besides in the same pa tient, under identical experimental conditions serum penicillin concentrations following the continuous intramuscular drip tended to be consistently lower than those obtained by the continuous intravenous

The method of continuous intravenous drip is technically more difficult than fractional or continu ous intramuscular dosage. The use of 33-gauge xeedles and the utilization of veins about the wrast ocerm, and legs overcome many of the difficulties This method causes minimum discomfort and is well

The incorporation of beparin in the venoclysis n believed of value in continuous intravenous therapy It is possible to keep the drip at a single tite for 14 days It is, however, preferable to change the site every 3 or 4 days. The high serum levels thus obtained make it possible to attack infections itherto considered inaccessible to penicillin therapy atterne resistance of an infecting agent should no longer be a deterrent to attempts at penicillin treat ment. Massive dosage even up to 10 000 000 units per day does not produce symptoms of toxicity

SAMUEL KAHN M.D

# ANTISEPTIC SURGERY TREATMENT OF WOUNDS AND INFECTIONS

Harrey E. N., Butler E. G. McMillen J. H. and Puckett, W. O.: Mechanism of Wounding Il at Med., Chic, 1945 8 9

High velocity musiles have been observed by means of high speed moving pictures (from 2000 to 7,000 frames a second) abowing the movement of the musile in water and gelatin gei Roentgenograms taken with a one millionth second exposure demon strate that similar changes occur in living tissues of Anotherized dogs and cats. This investigation cambits shock waves in tissues, the formation of a

very large temporary cavity which pulsates several times before subsiding a region of extravasated blood and a permanent cavity larger than the cross sectional area of a missile.

In general, it can be stated that the effect of pene tration of a high velocity missile is analogous to that of a little explosion within the tissue

The article is accompanied by 17 figures showing the successive steps of the penetration of a missile and microsecond roentgenograms of mustles passing through tissues and substances

# RICHARD J BENNETT JR M D Young, M. W: Mechanics of Blast Injuries 11 or

During the present war some antipersonnel mines and concussion bombs were preceded by pilot bombs, screeches noise makers buries, or even sirens and these were apparently designed to produce a reflex contraction of the voluntary muscles of the body and this, in turn, produced an initial increase in venous and cerebrospinal fluid pressure Voluntary muscle contraction will produce an increase in venous pressure. An increase in venous pressure is transmitted to the cerebrospual fluid. When an actual bomb explosion follows the preliminary noise, the preliminary sounds could serve as a warning for persons nearby to voluntarily contract all their muscles thus raising the venous pressure when the actual explosion occurs this increased venous pressure is again greatly increased by the sudden ex plosion which causes a wave of increased atmospheric pressure. This concussion wave causes a sudden pressure surrounding the body and it produces an increased pressure on the body and its fluids. Sailors undergo a similar ex perience when caught by the water concussion wave of a depth charge. When applied to the body this increased pressure may be as much as several atmos-The pressure on all the body surfaces and fluids is increased except within the craniovertebral space which is protected from external forces by a arm bony globe. The pressure within the cranium at the instant of increased atmospheric pressure is for an instant the lowest in the body The blood from other areas is literally aqueezed into this low pressure outce areas of meeting appropriate and processing processing area in the cranium. The cranium becomes quickly filled with fluid and then experiences the maximum force of the external pressure.

Experiments were carried out in which preliminary ligations of the jugular veins were done, and the agained of the Juguis, veins were done, and the strated that preliminary ligation of the jugular veins will almost completely prevent the increase in intracranial pressure. From the practical stand point when preliminary noises give warning of an impending explosion, it would be to the individual s advantage to be taught to compress his jugular vein rather than cover his ears by so doing he is able to protect his nervous system from the greater com pression soon to follow

RICHARD J BENNETT JR., M.D.

Padgett E. C., and Gaskins, J. H.: The Lee of Skin Flaps in the Repair of Scatted or Ulcerative Defect over Bone and Tendons, Surgery 1945, 137.

The results and condust on sited in this articliare based upon a sense of open patients operated upon during a 15 year period for the purpose of correcting chronic ulcerative les ons or deep adherent sears. The maj into of lesions were on the extremities.

In selecting the optimum method I r coverage of uch defects one has to balance the util twof a skin graft arain t that of a skin dap. Each has certain advanta es 1 lun graft can usuall be placed in one geration, while a skin flap will take at least two perative pricedures. Askin graft has about normal thicknes and gets its nerve supply quicker than a kin flap which is often rather thick in appearance In general, a kin flap has the advantages of a fairly high resistance to infection, some theknes for the purpose of filling a defect it slightly lengthens an amputated extremity and it covers a thumb of fineer recon tructed by means if a bon graft with subcutaneou to u It can be used to or a reseal tendon nerve and bones a dicital bases with leficient blood supply uch a readiation to ex and sloughs I rithe builing form steeps nighteds ness for building a part requiring to salt pluble en thelial urfaces and some theckness ch a the nore the cheek, and the up and a a freet cover I r bone i cartilare the ped cled kin flap has littl competiti n

It emplies the that oftens is not a can be trainguistic to the oppose telegrankle or foot with afety and the resolutant septic dended have from which the flap was removed covered by a kingraft at the first operation which a set time and a con idetable

number of operations. In 50 the occurrence we will be seen that the content that the conten

fign occurred in a of those cases. In the cases in which the figns were applied to the Lower enterempt the mainty. The less were due to trained in a scarce the high were used. One of these a reviewed like a leading of the take because finered. If the distance for fign were used. In each of the partially lest fine that the case of the cases of the leading and the language of the way of the cases the table as a correct like the language record like the language cases. In other was a partial but them, as a partial but them as a partial but them.

I a case with all defect on rith and ring that he all periodel lateral ray was ransed a ter a relating incision was made posterior the about brought forward and subcreto to the mission and subcretonors in the line of the cases was the result entirely assistant or few wound became incerted and a had partial or a loss of the flap which required train or discovered for the propose teal.

JEER J M. Dark MI

Patterson T C., Keating, C., and Glegg, R. W. Esperiences in the Frophylaris and Trainer of Gostridial Infection. In Casualties from Invasion of Europe. But J. Surg. 131 (1)

The authors report 16 proved cases of a such infection which were treated by beal care in older gangemons mouse as full a circumsusce permit or it no alternative remained, by amount too. The wounds were impated fresh with a hidrogen perusale a lution to remove to and lightly dired after which they were infection of the analysis of the provides and lightly dired after which they were infection of the impation and front inject with a "frost" of sulfathizated and is percentaged. In this impation and front inject were frequently produced a wind's charry cally that an early seen they such was given a fact of the pointy of cases a does of yar was given, for the

it mi every 4 hours.

Int gas gaageroe serum was also used a me the cases. The normal procedure was 1 me 15 to 30 ce dulated with equal parts of surestion, intra veron by an 11 superheavest than 10 ce intramendarist. The dwage was revealed to bours until it was one adered that the tournal been eliminated and the wounds were well eat, was to being healed. Each cub occurrenced with the tournal was to being healed. Each cub occurrenced was altitude contained 4 good in 1. The largest decision of the superheave and the superh

Pencilla was used prophylactically in a cost twas concluded that penk lilin coal fact by partited to prevent the development of acart to the litwar used intra more ularly as an and is terminal in 9 cases—15 coo units bern a m

There was a death from broadsquears as the anaerobic infect on had suffich. Serious

were performed of a sums and a fee. In summary the author records that a course, a still the keynote of peoply is another ment of gas praymer. The most useful a fee seem at present are antigate paragrar around the build have a fee and the summary of the seem of the people of the pe

Tra livering

Cledhill W. C.: Ga. Gangrene Thirty Three Cases, with 1 Death, Treated at a Forward Coneral Hospital in Italy. Leuce, Lond. 11

Control al reference moved from Monate

the European theater Heretofore most reports have dealt with cases seen chiefly at the forward casualty clearing stations and the field surgical units level and have shown fatality rates of from 30 to 60

ner cent

The 33 cases reported here were treated at a for ward general hospital in Italy and there was but I death, which occurred long after the clostridial infection had been controlled. Most of the infections were recognized in from 4 to 5 days after wounding and may have been less fulminating and severe than the previously reported cases however at least 10 of the cases were fulminating so that some other explanation of the low mortality must be sought Although ample supplies of penicillin were available, it was not considered justifiable to depend on this drug alone. Full use was made of blood gas gangrene antiserum and sulfonamides

The diagnosis of gas gangrene is essentially clinical. In general the most reliable sums of clostridial infection were pain or heaviness in a limb a rising pulse rate with moderate pyrexia curious mental alertness actionic tange of the facies with circumoral pallor low blood pressure the characteristic odor and the lifeless appearance of the muscles. Crepitus was not a prominent sign. Its presence is not a reliable guide to the extent of infection in the under lying muscles, for it is ordinarily found in the subcutaneous tissues well in advance of the muscle involvement. The importance of this fact is illustrated by a cases in which crepitus could be elicited up to the abdominal wall, and yet it was possible to amputate successfully through the middle or upper therh.

Cases were classified as of 3 definite clinical types gas abscess (6 cases) clostridial myonitis (17 cases)

and fulminating gas gangrene (10 cases)

The sheet anchor of treatment in fulminating gas gangrene is early surgical removal of the source of the toxemia. This usually means amputation in cases in which it is possible, or muscle excision on a large scale. The principle of efficient surgical excasion must still be maintained but experience with penicillm and the sulfonamides encourages the hope that a more conservative approach may be justified in the future. As experience with and confidence in pencillin increased in this series the approach became less radical with the result that several limbs were saved. In addition to large amounts of blood and antiserum, the average parenteral dose of penicilin per case was from 300 000 to 500 000 units given at a hourly intramuscular injections of 20,000 units. As the outcome is usually determined in from 24 to 72 hours this will suffice. Most patients were given a course of from 25 to 30 gm. of sulfathiasole

very low mortality rate was achieved and the number of amputations (5) was low Although as a group the cases were of less seventy than those seen in forward areas, all the men were extremely ill on admission and the 10 fulminating cases were comparable to those seen in the field surgical units. Penicillin used prophylactically both locally and

parenterally did not prevent the onset of gas gan-JOHN L. LIMPQUIST M.D.

Meleney F L., Friedman S T and Harvey H. D The Treatment of Progressive Bacteria Syner distic Gandrene with Penicillin Surgery 1044 18 423

Progressive bacterial synergistic gangrene, due to the associated presence of a nucroaerophilic non hemolytic streptococcus and a hemolytic staphy lococcus aureus is now accepted as a clinical entity The authors report a cases of this malady that were

treated with penicillin

A patient critically ill with pulmonary abscesses and empyema, failed to respond to sulfadiazine and was treated by resection of a rib and drainage. The typical lesion of progressive bacterial synergistic gangrene developed around the wound in the chest wall. The use of penicillin intramuscularly and in trapleurally resulted in healing of the gangrenous ulcer and cure of the patient.

In a second patient an enterostomy was done following resection of the gangrenous terminal loops of the lleum. Although sulfadiasme was used post operatively the patient developed the lesion of progressive bacterial synergistic gangrene around the enterostomy wound. The spreading infection was brought under control by the use of penicillin

intravenously and the lemon healed

In a third case of multiple boils a number of bacterial species including the microacrophilic non hemolytic streptococcus and the staphylococcus aureus were isolated. In this patient, the lessons while they had most of the characteristics of the progressive hacterial synergistic gangrene as des cribed in previous reports differed in three respects In the first place they were multiple second they were not excruciatingly painful and third the zone of gangrene was relatively narrow These lesions responded unsatisfactorily to penicillin or to other forms of therapy and the patient died from a pulmonary embulus.

The sulfonamides have not been effective in controlling progressive bacterial synergistic gan grene but penicillin offers real hope.

DAVID H. LYKN M D

Brown, C. W. McClintock, L. A. and Neary E. R : Established Surgical Infections Treatment with Urea-Sulfanilamide Mixture Am J Surg 1945 70 4

The topical use of sulfonamides alone in necrotic or purulent wounds is known to be of little or no therapeutic value. On the other hand reports of experimental and clinical studies indicate that in the local treatment of grossly infected wounds urea sulfonamide mixtures possess valuable antibacterial and related therapeutic properties.

The purpose of this investigation is to evaluate the urea sulfanilamide mixture in the local treatment of established chronic surgical infections. The urea sulfanilamide which was used was a crystalline mix

ture con intimed a parts of urea and a part of sulfanilamide. This specific muture was selected as most sati factors on the basis of experimental and clusted observations. The crystalline components in the selected mixture when penerously applied to a wound supplied the maximal percentage of relatively insoluble sulfanilamide which would not give ruse to foreir-body reaction, and an excess of freely soluble urea sufficient to assure its prolonged action is the

It was supplied in scaled, resilient, plastic tubes within which the crystalline drugs had been steri lived it a nontonic, chemical process that does not a versely affect either the uras or milionamide crystals. Staty hospitalized cases of section—chiefly chronic—surgical infections were studied. They represented most of the usual variety of such infections even in general hospital practice and consisted of hemator-cause and post traumatic osteomy clifts, purulent and necrotic skin defects that required grafting polimonary absences and thoracic empyrma with external sinus tracts, and micrellaneous executed including infected postoperative wounds trophic including infected postoperative wounds trophic including infected postoperative wounds trophic

In a littion several cases of suppurative peritontil were studied particularly to determine the
atte of absorption of sulforamide from an infected
sensal urface if llwing the topical application of
urer sulfanitumed. In all cases in which the inif cted wound was external the lesion was dressed
note daily and the entire surface area of the wound
was freely covered with insufficient ures sulfanilam for This required the daily application of from
it so gm of the mixture per patient. In cases of
iraning lung absoress and emptyrms from 10 to 30
cm f urea ulfanilamide per day were applied
lesilie aft is unsertion of the insufficing container
to the h rt mu tract. The more devious fista
tract were filled daily with the mixture by
the state of the situation of the mixture has the situate by
the state of the situation of the situa

mean f a wit rubber catheter attached to the in ufflating container. Intraperitonealls a single dise I from to to zo gm. of urea sulfanilamide was implanted at the time of operation.

Carrid appraisal of a chemotherapeutic agent in regical infections requires a plan of invert cation that con if it the many variable factors which may afturnee the results including among other deter mining elements the duration, previous treatment extent. It is us destruction, and bacterial population of such infection.

Frequent studies of the qualitative and quantitative hast rul population of all wounds provided a mean of confirming clinical response to treatment with urea-widthulamide. Wound cultives were made at the start of treatment and, insofar as possible every three to five days d mag treatment with the minture. Specially prepared wals which absorbed approximately 0 is co. of Build, were useful colorism samples of wound crudates. From saline su-per-i of these aeroids and anisonous were made on meat indusine sign with det tops and or sold thoughter-like agar respect rely.

Cultures on blood agar and in tryptime; print broth were also routine. In addition extrait vitro of the antibacterial threbold concerns: we sulfandamide for organisms isolated from oral wounds at the start of treatment helped to cauch the degree of sulf namide-resistance that they be terial invaders manifested in falling to trace a carifer treatment with sulforamide along.

Periodic hemopoletic, blood chemistry a detepertinent laboratory studies were made in all case Clinical progress was charted and recorded is t

usual way

As prea-sulfanliamble comes in contact a typurplent caudate it rapidly goes into believe allong as the wound discharge is profess a dry redressing is best u ed after in uffaithout the neimote the wound. Local edema rapidly sulfers
the amount of wound certainte practive demiwithin a few days. At this point it has beref
activable to employ directings soulded in sulms at
tion instead of dry gaure directings. Salme drawn
wound and do not impede local alsorption of t
mixture.

As wound edema subsides it seem that vacularization occurs and granulation propose more rapidly than usual. When healthy probation have appeared and wound discharge is said much smaller amounts of insuffacted unested in which was not restard epithelization as healthy and the mount of the mixture are likely to d attained of the mixture are likely to d attained in increase within defects however generous quities of urea-subfanilamide may be topically as up to the time of grafiling.

In none of the cases studend ha e any rant of a contract that could be construed as a rounder of local or systemic toxicity to unestellation of local or systemic toxicity to unestellation. No significantly abnormal findly a stribut. At the use of the initiate have been demonstrate frequent hematological and urinary student terminate. Because Cases (Arthur Cases) and treatment.

Ory E. M., Meads, M., and Finland, M.: Ferlcilla \ J Am. M An 1943 129 137

Se cetal forms of pendellin have been for theful cultures of pendellium notatum. There of the known a pendellium for and N in the creaty is as pendellin it, a and prepetitively for for all Pri have been isolated in crystallined ten. Common pendellium prepared from deep var cellium conalmost entirel of pendellin C but those priform shallow surface cell res in fa is may of a appreciable amounts if pendellin N varyi & r 2 or 18 per cent

When feeted sim it now he with profit containing 65 per cent for m to die not a 2 kg, with connected kis which contist shorter the pendill n Construction is trained from a kernel to the connected and deep process from to the containing the connected as a connec

viridans were twice as sensitive to penicillin \ and most of the staphylococci were equally sensitive to

the two kinds of penicillin.

Levels of penicillin activity in the serum argument a strain of hemolytic streptococcus were significantly higher and sustained longer after intra muscular injections of penicillin X than after in jections of the same number of units of regular penicillin.

The methods used both in determining the sensi tivity of bacteria and in estimating the serum con centrations are admittedly crude. It is most un likely however that the consistent differences between the commercial preparations and the lots of penicillin \ observed in the authors studies could be explained on the basis of such methods The results obtained with the different lots of penicillin serves to emphasize the superiority of the penicillin \

The findings suggest that comparable therapeutic results may be expected with the use of smaller doses or with the same doses given at longer intervals

when penicillin 🔪 is used

A preliminary clinical trial indicated that peni cillin X is nontoxic and at least as effective as regular penicillin in the same doses in cases of pneumonia and probably more effective in conococcic infections Further chnical trials with the use of smaller doses and longer intervals are necessary in order to establish the therapeutic superiority of penicillin \

TOSKPR K. NARAT M.D.

illrah, H. L., and Dowling H. F : Observations on the Continuous Intramuscular Method of Administering Penicillin. Am. J M Se., 1945 210 435.

Use of the constant intramuscular method of penseillin administration in 110 patients is reported and the concentration in the blood of patients studied is compared with that achieved by other methods.

The amount of sodium peniculin required for 12 hours was usually dissolved in 1 000 c.c. of isotonic salt solution and allowed to flow at a constant rate of from 30 to 40 drops per minute into the lateral aspect of the thigh or into the gluteal muscles. When administered at the rate of 200 000 units in 24 hours the concentration of penicillin in the blood remained constant and at therapeutically effective levels 96 per cent of the time whereas with the in jection of 25,000 units every three hours similar concentration was obtained only 80 per cent of the time. The corresponding figures for the injection of 20 000 and 15 000 units every 2 hours were 67 and 63 per cent respectively

No deleterious effects or complications were observed except for mild to moderate pain or discomfort at the site of injection in 6 patients. Pain was usually prevented by changing the location of the needle every 24 to 96 hours Prompt and complete relief of pain was obtained by the addition of procaine to the penicillin solution. This method avoids repeated painful intramuscular or intra venous injections, traumatization of the veins and phlebothrombosis. The patient has almost complete freedom of activity

The authors believe the continuous intramuscular drip to be the method of choice in very ill patients who require continuously high blood concentrations of penicilin. WALTER H. NADLER M.D.

### Balley H.: The Treatment of Carvical Collar-Stud Abecesses with Skin Involvement Brit J Sure... 1945 33 53

The author describes his experience with 200 cases of tuberculous collar-stud abscesses Conservative management of these cases consisting of aspiration incusion or incision and acraping is considered a pernicious practice. Wide open excision is recom

In about 25 per cent of the cases the superficial abscess does not overlie the broken down glands that feed it indeed the factory' and the storehouse may be as much as 6 or 8 inches apart. If success is to attend the method of treatment, it is fundamental to remove not only the abscess but also the degene rating glands and the testula which connects them

A proper preoperative clinical examination of the whole neck will unmask the long stemmed collar stud abscess which is the one requiring special

consideration.

The standard technique of treatment is as follows 1 Excusion of all unhealthy akin, including akin that at first sight appears healthy but on closer ex amination is found to be undermined and pathological on its under surface.

2 Complete dissection of relevant diseased lymph atic glands. When the sternomastold interferes with their clear display the muscle is divided and sub-

sequently reunited

3 Hemostasis being rendered as perfect as possible the cavity is sprinkled with sulfanilamide pow der and the hole filled with vaseline gauze as it enters the wound, powder is poured on to the gauze, which is never allowed to touch the skin. The vase line gauge must be of the right consistency of it is too soft it tends to become displaced and if too dry it sticks to the granulations.

4. The cavity having been packed moderately firmly and filled completely but not to overflowing more sulfanilamide powder is sprinkled on to the surface and a piece of the tuile gras laid over the mouth of the wound so as to overlap its edges

 A viscopaste bandage is applied in such a way as to immobilize the neck. Formerly the author used a plaster cast. It is of great importance that the bandage is applied properly so that the patient, often s child, cannot displace it and expose any part of the wound

The author stresses the fact that all diseased glands must be removed as otherwise a chronic sinus will develop. If during the intervals of repacking the bandage becomes disarranged and the wound be comes exposed secondary infection is likely to occur

Dressings should be changed every 7 days under absolute asspite precautions, this should be d ne by a competent person. In making incisions the surgeon must take Langer's lines into consideration

In describing the end results the author states that large craters in the neck readily develop clean granulating surfaces and become epithelized without skin grafting. More often than not the resulting scars are not unsightly and are often linear.

LCCI VI FRONDETL M D

### ANESTRESIA

lundy J S Adam R C, and Seldon T II : Factors Influencing Trends in Anesthesia. Surgery 044 8 t

It the Mayo Clinic the use of methods of anesthesia in the application of which special personnel is employed (for examplpinal and regional anesthena that is administered by the professional anesthetist intravenous anesthesia intratracheal anesthesia exclusivipane curare and so forth) has increased from 6.7 per cent in 1924 to 65.4 per cent in 1943 Tribromethyl alcohol as a rectal ane-thetic has been more satisfactory than oil and ether by rectum. Barbiturates by rectum plus tribromethyl alcohol lel n t hav any apparent advantage over tribromethyl alcohol alone. The use of acetylene wa discontinued after 1010 because of the danger of exince 1937 intravenously administered pentothal sod um ha been employed in about a third of the cases in which special methods of anestheria were used

The explosion hazard in the use of cyclopropane is il recognized and there have been reports of sud- in recognized and there have been reports of sud- on collapse of patients at the end of long operation a well a of forbilation due to the drug. It would appear that if no observes the recommended pre- cautions in the use of cyclopropane it is a whilely useful agent but it is not an essential one except in a limited field particularly thoracle surger.

The use of Magill's intratraches! tube has greatly enhanced the value of the inhalation anesthetic

agents.

For the last eight years there has been little change in the percentage of employment of the agent used at present.

Barach A. L., and Rosenstine E. A.: The Hazard of Anoxia during Vitrous Oxide Anesthesia

furtheridary 1913 6 442.
The motibility and me that by foll using the use of nitrous oxide for surgical assesthesia have increased despit the reforements I adminit tration and the more me ferm techniques. The safest of all ance their agent "used in 1920 has been me one I the most if not the most, dangerous one today. Its strongest end-section the been its lack of it use reaction I ranv in use it non-inflammability and its lack of discovering the patient through its rapid, pleasant industrion and envergence. Its rapid serious importing the safest in the reference in the referenc

the requirements of surgical anesthetis in a sewho has not received previous depress to the medication is me degree of another that the accompaniment Previous reports from other ethave demonstrated that patients accusted by a nitrous oxide will always softer from a sever depeof anoxia. When the percentage of oxygen is implied gases is below 13 per cent the attraoxygen tensions were in the range of currer in physical some of mercers.

The extensive studies of Courville and riber search workers have shown that serious as ve. 1 fatal results may follow nitrogs aid one anothesia even though it is adminutered libe. gross error and by accepted techniques. Eu are given of patients who had died suddenly du a ancethesia with nitrous oxide or also by duri exodus after the agent was used. Inother group of cases was discussed in which recovery occurred) residual mental symptoms indicated certical data age of the nervous system. A final group i the patients who had transient mental and er x manifestations but apparently recovered compytics There is essential agreement with Cournile's 4 that such lesions most often include scienc - 12" tered pyramidal nerve cells, patchy perross, or eration of various cortical lavers subt tal deliver tion of limited portions of the cortex, and rat k-ions in the lenticular nucleus. It seems p from Barach's work an l others that permanel damage in the frontal lobe cortex a well as in c. areas I the brain may take place with I tile chi " personality change although subtle d turbacti In emotional response may have been process Next to the brain the heart is the rgan most se sitive t anoxia. This may be manifested by and coronary in ufficiency without the watning 15"

of pectoral pain.

The authors propose the dispensing of cyl... For containing 80 per cent nitroe oxide and roper or oxygen to avoid the postbill for all arms der 8 nitroes oxide administration. Lach cylinder 6 he filled with 150 gallom of the mixtor at 100 prec ure 1 per cent parallal uniform conceptors (ther 4 per cent pas mixture. The authors have arms arms to the second of the mixtor at 100 per center of the per center

Masson, G. M. G., and Beland. E.1 Influence of the Liver and Kidney on the Duration of Antthesia Produced by Barbiturates. Auctionacy 1043 6, 451.

The object of the authors as t size. Let biturates by means I partially bequated employed compactly rephrectomend a mail as whether t not a relationship ratifal it on I duration I active of these components and the I then deterification. The partial is also selve the repriment in a breacht up to day when

ous references. The method of procedures was lescribed in detail.

Trenty-nine barbiture compounds were studied and the results abulated in such a manner as to magnet a new classification of the barbiturates recording to the site of their detoxification. The network of detoxification was represented as the irreage duration of anesthesia of control animals is compared with average duration of anesthesis of experimental animals. This index figure was determined for each compound in the partially inpatectomized and the completely nephrectomized animals.

The authors suggested that group r contain those arbitrates detoxified mainly in the kidney—bar bital and phenobarbital group a contain those barbitrates detoxified mainly in the liver—ipral imstol, nembutal, ortal, alurate, nostal, seconal, slilyl-pental evipal, and thioethamyl group 3 contain those barbiturates detoxified approximately squally in the liver and kkiney—neonal delvinal phanodorn, and dial and group 4 those barbiturates of substitution of the body but not to any great extent in the liver or kidneys—centothal, propyl r methylallyl and allyl r methyl lilyl thobarbiturates

MARY KARF M.D

Robin, P. A. and Collins, V. J. Roentgenological Study of the Male Sacrum As an Aid in Caudal Analgesia. Anasthesiology 1945 6 505

Fifty unselected cases were subjected to a pre immary roentgenological examination of the sa crum Caudal analgesia was then carried out ladependently and analysis of the results made

The method of x ray study was described in detail I routine anteroposterior view of the sacrum was obtained to determine the apex of the caudal canal and to measure the transverse diameter of the caudal canal histus at the level of the 4th sacral segment. Body section roentgenography was used for the lateral view and three or four planigraphic views were made close to the midline to obtain a more accurate delineation of the caudal canal. It was found that the apex of the caudal canal histus was ntuated at the 3rd sacral segment in 46 per cent of the cases and below the 3rd sacral segment in 32 per cent. In 66 per cent of the cases the anteroposterior diameter was between 2 and 5 mm in 20 per cent it measured between 3 and 4 mm and in 16 per cent it measured less than 2 mm. There was found to be a direct correlation between these find ings and the case with which the canal was entered. in 6 cases or 12 per cent, no histus was apparent on the film, and it was believed a complete bony block of the opening of the caudal canal existed Variation in size of the intertuberous diameter was not marked or significant. In 6 per cent of the cases no opening of the caudal canal was revealed on the anteroposterior films. This differed from the results as viewed on the lateral planigraphic films, but was explained by the lack of depth of the histus and the possible distortion of the film

In to per cent of the cases small apertures were seen in the posterior wall of the caudal canal in 14 per cent the cornus were flat or absent. A completely blocked lumen of the canal at the opening was noted in 10 per cent and a partial block either at the open ing or above was observed in 14 per cent of the cases. The sacrum appeared to deviate from the midline in 6 per cent of the cases and there was an exaggerated sacral curve in 16 per cent.

When observations were made on the patients after caudal anesthesia was attempted, it was found that 8 cases, or 16 per cent, were unsuccessful cases because of the inability to introduce the needle into the caudal canal. Most of these cases had roent genographic findings that showed a complete block of the lumen or an absence of the lumen.

A method of x ray study of the sacrum with special reference to the caudal canal was thus presented The studies indicated the importance of preliminary roentgenological investigation prior to the attempt to produce caudal analgesia. The significant ana tomical findings contributing to unsuccessful analgesia were a narrowed anteroposterior diameter absence of the hiatus a blocked lumen and agenesia of the posterior wall of the caudal canal.

Mary Karp M D

Newton C. W., Jr and Andros, G J: Continuous Caudal Analgesia in Curettage for Abortion Am. J Obs., 1945 50 A30

In an attempt to decrease the blood loss at the time of therapeutic abortion and curettage for in complete abortion, the authors have used continuous caudal analgesia as an anesthetic method. This mechnique maintains tonicity of the uterine muscle and at the same time provides analgesia of the perineum, vagina, and of the cervical and fundal portlons of the uterus.

In 22 consecutive cases the average blood loss was less than 40 cc, exp petient varying from less than 5 cc, to 125 cc. Seventeen of the patients lost 50 cc. or less. There were no anesthetic, operative, or post operative complications. Postoperative convalications and return to normal activity of the patient is hastened.

Roman Vega, D. A., and Adriani J. The Efficiency of 'Oenethyi' (2 Methyi Amino-Heptane) As a Vasopressor Substance for Spinal Anestheata Seath: If J. 1945, 38, 635

Because aliphate ammes have never been employed for overcoming the hypotension of spinal anesthesia, the authors have been interested in determining the clinical value of such a compound for this purpose. This report comprises experiments with openethyl in 700 sungical patients with a pre-liminary report on the first 100 patients. 2 Methyl amino-heptane, or oenethyl is a clear volatile liquid which is alightly soluble in water and mildly alkaline. Its vasopressor action is smillar to but more sustained than that of epinephrine. It produces a rise in both svitolic and distolic pressur-

and an increase in pulse pressure with Improvement in heart action, dilatation of the pepulic pilorection, a bronchodilatory action decrease in renal volume and some attimulation of respiration, but no action on the smooth muscle of the attents. Its pressor effect is due largely to construction of the arterioles. Its totacity is low and if does not appear to have any direct stimulating or depressing action upon the central nervous system. Large doese may cause weaknest letharpy drowniers or protration, and toucity is manifested by hypotension and decreasing in the pulse rate.

Infly three per cent of the cases tudied received centriby! prophylactically to avoid anticipated hypoten ion. In the rest of the cases the drug was g. n therapeutically to combat hypotension when it appeared. The drug was administered intra muscularly or intravenously the latter route being chosen when an acute hypotension occurred. The lrug appeared to be an effective vasopressor which uncersidults combated the hypotension of spinal anesthesia in the majority of the patients to whom it was administered. In 5 per cent of the cases it falled.

to restore the blood pressure to the preoperative lev 1 However in no case del it fail to cause some levation.

From 5 to 100 mgm. I the drug were found to be the therapeutic does for intramuscular injection. When used intravenous it the effective does varied. from 10 to 50 mgm, and the best results sen a stained by administering the drug slowly in  $\Delta z$  doses of 10 mgm each and allowing co-halp and to lapse between the administration of each  $h_L = 0$  regressive and as temporary disturbance in order hythm

Nemogressor studies on 6 subjects showed a new atton of pressure to preanesthetic levels. They are no significant alteration in pulse rate. They are it the patients do not observed at any time. It they are it the patients do semontant oppollarly distant what the patients of the more tracted popullarly distant when the patients of the more tracted by a minute of the control of the patients of the

In 25 patients the drug was a insustered a replaced in sulfate had failed to restore the first pressure to sati factory levels and in all of the cases the blood pressure rose satisfactorily.

The authors concluded that "oencity!" s, 25 to be a sati fact ry vasopressor f r spinal arest 22 and recommended its further clinical trial.

M RY KARY MIR

### PHYSICOCHEMICAL METHODS IN SURGERY

#### ROENTGENOLOGY

Krause, G. R.: The Roentgen Disgnosis of Pulmonary Infarcts. Rediology 1945 45 107

Roentgenologically a pulmonary infarct may mimic any other lung disease and be interpreted in correctly more often than any other pulmonary lesion. This may be due to its supposed rainty

The author reviewed 344 cases of lung infarct who were seen at autops. The infarct was the direct cause or major contributory cause of death in 174 cases and in only 22 per cent of that number was it dagnased correctly. In 73 cases ciliacal and roentgenological correlation with postmortem findings was adequate.

The literature reviews many positive roentgen indings of pulmonary infarct. Wharton and Psenson (1922) described clouding in the costophrenic angle as an early sign of infarct. Wester and Jaches (1923) described the triangular shadow with the base toward the axilla. Smith (1938) described 6 signs of infarct hazy, horizontal, clouding at the base the suggestion of pleural effusion, increased circular density with cavity formation, dense linear shadow and basal collapse of a lobe. Westermark (1938) described the area of avascularity in the region of the imbolus. Jelien (1939) stated that an infarct may not be apparent for several days following the embolic process:

The majority of infarcts occur in cardiac and postoperative patients Clinical findings of pul monery infarct are sudden, sharp pleural pain and dyspace moderate elevation of the temperature and white blood count, with a gradual return to normal within a few days if the patient survives Chilling is almost never present. The physical findings are

raise change in breath sounds and friction rub. Most infarcts occur in the right lower lobe they are frequently multiple and their average size is from 1 to 6 cm. The shape of the infarct tends to follow the lung contour and is not characteristic. Super imposition of infarcts may also cause a variation of the thane.

Complications of pollmonary infarct are secondary broachopneumonia pleural effusion, lung abscess and pollmonopleural fistula. These complications obscure the detail and make the interpretation much more difficult.

Healing of infarcts does not occur by resolution. The necrotic tissue is replaced by fibrous tissue which results in scar formation and may be stellate or linear in type.

Infarcts must be differentiated from lobar pneumonia bronchopneumonia atypical pneumonia, imora passive hyperemia, pleural effusion cysts and plaques of atelectasis.

In lobar pneumonia the pulmonary involvement is greater than that in the presence of an infarct.

Within a 24 to 48-hour period it may spread rapidly in spate of good clinical response to chemotherapy In bronchopneumonis the involvement in the bases is multiple patchy and mottled. Atypical pneumonia resembles bronchopneumonia. Primary pul monary tumors with resultant collapse of the lung can best be demonstrated by overexposed Bucky films Passive hyperemia causes a dense bilateral linear shadow in the hilum radiating to the periphery with a gradual fading Pleural effusion may be either free or encapsulated Free fluid occurs in the lower lateral portion of the lung field with a smooth curved upper border and a convexity inferior. The superior border of an infarct in this area is straight with a convexity upward. Infarcts are never ellipti cal as in interlobar effusions. Air filled or fluid level cysts present no diagnostic difficulty however cysts filled with fluid do These rarely occur against a pleural surface and are almost apherical in shape Plaque or disk atelectasis may be difficult to distinguish from an early infarct. However within a few hours the picture will have changed so that a diagnosis of atelectasis may be eliminated or confirmed. All infarcts leave scars and reach the pleural surface at some point they may be multiple are found at different planes and are shorter than atelectatic plates

Since pulmonary infarcts may mumic any other iung lesion it is essential to analyze the roentgen and clinical data carefully for the welfare of the patient. If this is done, an accurate diagnosis of pulmonary infarct will be expedited with prompt instillation of adequate therapy. Mayurer D Saczi, M D

Thomas S. F: The Value of Gastric Pneumog raphy in Roentgen Diagnosis. Redisleys 1945
45, 128

Although the importance of gastric pneumography localising a mass in the body or tail of the pancreas has been stressed by previous writers to date very little attention has been paid to this useful procedure as a means of localizing tumors in the upper abdomen

For the purpose of distending the stomach the author modified the original technique of Engel and Lysholm by using a small calibered stomach tube instead of effervescent powders. The quantity of air injected varied from 300 to 800 ca. The patient lies prone with high supports under the pelvis and chest. The x ray beam is hotsontal and a vertical Bucky dapphragm is used.

The normal retrogastre space is equal to the depth of the first or second lumbar vertebra. Can tion must be exercised in removing all fluid and food contents from the stomach prior to the installations of air or diagnostic errors may emue. Aside from pancreatle pathology the retrogastric space may be increased by obesity asides liver tumors meta

t tiens les retripent neal tum is and invain of ti panerea i prifrately treulers However the a ther help on that at a the paneres is in-lived, their entren appearance is clean-out

I write if 35 ca es were studied clinicall by mean if a time procure craphy and all of the cases were ug retire i path-der in theb is or tall of the cancers. A a result of this study it is believed that go the pheum grams are of dean to supplementary la in the diagnoss and location of nathological

nlargement in the bod or tail of the pancreas

MATTER D Such, M.D.

#### Pollard H M., and Cooper R. R.: Hypertrophic Castritis Simulating Gastric Carrinoma, Gan Prester 1. 24 1945 4 453

The symptems of chronic hypertrophic gastriti are in much I ke there of gastine ulcer or gastine neutin t, or they are entirely alreent. They charac ter tically appear from one to four bours after meal a I consist of dull burning pain distention a sense tem force are and ructus. Vom time belching and bland het evertelet. The only showed sien as seea sonal eriga the tendemess.

The importance of hypertrophic gastrit s as a cause of ea troutestinal bleeding ha been stressed repeatedly

The ga trovers is appearance is diagnostic. The m area is deer red beggy has a dimini hel number I highly his, and I was at normal between the rugal full which are large. Med rate inflation dies not affect th characteristic cobblestone resemblance and the pseud of depoid changes

There has been much controversy a to the value I turium meat in diagnosing hypertrophic gastritis The auth in observed season at the last restr How pital of Ann Arbor during the pa t 4 years in which toenteen exam nation showed filling defects strongly

a certise of carein ma. There cases are presented t nel rhumbs and the respects a neutron gram are used I the purpose I distration.

All patients were males their ages varying from 12 to to a see In all but a subsequent ga triscopy retails bed the dagment of hypertrephic ga tota with reasonable certainty. This was confirmed in 7 4th Accept Plagant mr anlandel the cause br hidd calesan atm the termedt as

Th IT couldn't recard to bepeting? c ga tr tu are drawn (e) when it i leasted it re eara el project gafflined feet mate 1 michaf ch it cult to a tage is mentare egraphically from that of carci ma (a) t error te market of nt a 111) neither twetgen met ga trescen c ex are not a recognitional and containing again T Lucent LD in it fol a salease

#### Hemphill, J E., and Reeves, R. Jt Roentgen Irradiation in the Treatment of Viarie-Struem pull Disease (1 tyles profitations de J FARL 12454

Mark structurely music is a cht me I meter se twave do le so ett er It is characterized b

in amount in fithe penanticular will towar live kint with remove a litaterilat of 11 place t mic manifestations

Perturent systems; manifestat ATT I TO emacustion secon ary aremia lived and inatrophs and acceptated pulse Local for me m ristory low back pain 1 flers L- a mote a, movele spa m a d in the late sare of tracture del milies, and those a 14los a The clinical picture of Marke arem ease is one with the patient feared at the le tened lumbar and exagrerated kirol enne t flat chest with limited extran i-n.

The early symptoms are an resu, ever fever and less of weight. Back pair an (worse in the morning) may be rainst as accentuated dunne fathere and overs inually the capacity f resert to decrease time limitation of met a fith a r a fithe eight ion. The sedimentation rate are, white is a reincreased.

Roentgen and res in early stages I he des may appear negative in the toutile sure. hereoblique a ces will show that yes of the artefacet eneculir there if the lith maler a Larly changes consist of decalorication as men lar trabeculation in the subch odral 1 we to 1 the joint with haziness and apparent so divithe joint space. Late changes show ester-" " the subchandral lany margins with name and or interact and destruct in of the art.co.arts a calculication of the ligaments with troft 7 and eventual analysis of the pine. Of the gree I cased namined overtiens longically to tell 1 or in the early group 38 (3 " ) weres to much a branced group a 1 th (23 ) were int eaba ! Ctoch

One bunded and st ty cases I Many Strom descente nel igifte") el il tat male and 21 (14 ) a re f male 111 (ci") ma the white race and o (6 ) werreifthee icin? The acco firs (11") to gold between 1" ! Three fourths of the patient bals er tores er one year

Ont gewolftestment i gren finer mit P? irradat n Hoth f re f therat are n er Ontherede treatment ship like tarte a rima pos l'el reclasat n fibernueles en al me esten nand esembet stragton in im " shahata-next phothers # Radat oth uprises at there wir! -111 when treats a mirror TI events filters at be repeated a limit to week

The tellimater tel n tatt f (es 1 mest) t d ment alef reference so then mistertell been a ut ? the state of the s patient treated revealed that en (told has also litetterar fwerrab t w la i per an

I a recurrence I th pane 1

treated patients, 20 per cent were symptom free one year after therap;

The authors emphasize that an early diagnosis and prompt orthopedic and x ray therapy will yield the best results

MAURICE D. SACHR, M.D.

### MISCELLANEOUS

Jolles, B: The Causes and Prevention of Radiotherapeutic Edema of the Larynx. Brit J Radiol., 1945 18 278.

The author correlates the available data which have an influence on the complex problems of edema of the larynx and draws certain conclusions as regards preventive or therapeutic measures

Physiopathology There are multiple factors upsetting the normal equilibrium between tissue spaces and the bloodstream such as (a) permeability of the membranes (b) osmotic and diffuse potentials (c) lymphatic and venous obstruction and (d) organ activity as for example edema surrounding the salivary glands. The last is of particular interest when the edema occurs in the neck undergoing ra dation treatment. Other factors are (1) infection (leucotoxine), (2) prechaposing factors as plethoric hydremia (s) millieu interieur in which the acids resulting from a breaking down of inflammatory or neoplastic tissue lead to the production of edema (4) sensory nerves and sympathetic local anesthesia which prevents or diminishes edema (5) hormones adrenalin-decreasing permeability and additionation, and (6) decreased extravascular pressure

Anatomy The term edema of the glotts is a missoner since most of the edema occurs in the appellottic folds. Weintraub who made an extensive study of the connective tissues of the neck describes—apart from the ordinary subcutsneous connective tissue—3 varieties of connective structures (1) a membranous periorganism of laminar sheelike connective tissue, which forms the adventitial covering of various organs and structures, (2) areclar or shearing connective tissues which form the anatomic or surgical spaces and lie between moving parts and (3) nerve-vessel carrying tissues which are intermediate in their physical consistency between the movement of the consistency between the consistency betwee

between the arcolar and membranous varieties. The second variety plays the most important role

in edema of the neck.

Radioblology There is always a lag between the irradiation and the first blochemical and histological changes corresponding to the clinical latent period. The variations of lons in the blood of irradiated per some and their effect on edema are shown in Table I

The many other factors which may influence the edema as the result of irradiation are grouped sche-

matically in Table II.

Treatment of classes. As may be seen a rather treemy picture is obtained in regard to the chances of treatment of radiotherapeutic edems. Nevertheless certain measures may prove of clinical benefit Amiked diet with adequate protein content is essen tal. Histaminase and vitamin C should be treed

TABLE I.—VARIATIONS OF IONS IN THE BLOOD IN IRRADIATED PERSONS

\-ray transmiseralization	Edema favoring and preventing factors  N. edema f. vering factor	
Cations N increased		
K increased	K edema favoring factor	
Ca decreased	Ca edema preventing factor	
Anions Phosphate increased	Pleashate edona preventing factor Bicarbonate edoma preventing factor	
Bicarbonate decreased		
CI decreased	CI atlems favoring factor	
Decrease in anions—more acid valueces	(N. Cl edema favoring factor) as transitor effect	

Foci of infection should be attended to Alkaline gargles (colluttorium phenolis alkalinum) seem ad vantageous in conjunction with alkaline mixtures per os and 10 per cent calcium gluconate given intra venously. For the combating of pain spraying of the throat every 4 hours with a solution of urethane 1:5 in water with 1 per cent cocaine and a few drops of peppermint is recom

TABLE II.—OTHER FACTORS WHICH MAY IN FLUENCE THE EDEMA AS THE RESULT OF IRRADIATION

Edema producing factors	How affected by growth	How affected by X-rays
Damage to vessel wall	P	F F=odema
Capillary dilatation	317	F favoring
Anoxia	F	F factor presen
Incremed hydrestatic pressure (pandre)	F	r
Adrenella deficiency	F	F
Infection	F	
Inflammation	F	7
Pain (via sympathetic)	F	F
Lymphetics	7	F
Venous obstruction	F	P
Organ activity (general)	P	F
Organ activity (specific)	F	7
Extravacular pressure		F
Scarring	-	Ť
Predisposing regional factors	F	F
Diffusion potentials	F	F
Metabolites		F
#H	P	F
Endocrines	F	F
Insalties	r	Γ
Histamba	7	1

mended Some patients object to the bitter taste of the spray but all of them agree that they feel much better with the spraying than without it

ithout it T Leocuma, M.D.

Lawson, F. E.; Gall Bladder Dys (Iodophthalsin Sodium); Effect of Intravenous Injections on the Coronary Flow Blood Pressure, and Blood Congulation And. Int. 14, 1945, 75, 43.

The dangers of intravenous cholecystography have been cited in the literature since 1915. A review of this literature by the author reveals that most of the patients sustained coronary arterial occlusion. One case of syncope with loss of the feers and urme was reported. Consequently cardiovascular disease was recarded as the chief contraindication.

The author adds his experience with 4 cases. Two of these are classed as anaphylactic shock mainly be cause the fall of the blood pressure responded to epicephrise and to conventional shock therapy. One of the patients complained of substrain pain, which was not relieved by theophylline ethylenediamine but serial electrocardiograms were negative.

The other a accidents are considered by the author as having been caused by coronary occlusion. Both patients showed electrocardographic changes conpatible with or indicating myocardial infarct. One patient died is days after the administration of the gall bladder dye (which in this case was given orally in contradistinction to the other cases) Both patients were known to have suffered from angina pectoris.

The following experiments were made in comer tion with this problem

1 Measurement and kymographic regutation of the coronary blood flow with the Monayin cameland of the carotid arterial pressure in a dop, before, during, and after the intravascular injection of gilbladder dye. The done was proportionate to turgiven to human adults. The injection cared a foi of the blood pressure and an increase of the coveray flow in all of the cases.

2 Determination of the influence of the platder dye (kodophthalem sodium) on the osquability of the blood of 7 human subjects by series of the De Takita heparin tolerance test. In 4 case the coagulation time was uncreased and in 5 cases was decreased. The blood pressure dropped in 5 patients and remained unchanced in 2

The author draws the following conclusions
I lodophthalein sodium produces an increase is
the coronary blood flow in does.

2 It causes the blood pressure to drop in human beings and in dogs.

3 The fall in blood pressure may explain the mechanism of shock which the author had occurs to observe twice.

4. The mechanism causing coronary arterial or clusion is not clear

5. The intravenous injection of icdophthales sodium is contraindicated in persons with coronary arteriosclerosis (if for no other known reason has the drop in blood pressure it causes)

GERRARY S CHRAIT, MA

### MISCELLANEOUS

# general bacterial, protozoan and parasitic infections

Vinnard R. T: Three Hundred and Fifty Two Cases of Tetanus. Surgery 1945 18 482.

Among 352 patients with tetanus treated from overmber 1 1934 to October 31 1944 the total mortality was 45 per cent excluding the deaths which occurred in the first 36 hours the net mortality was 34 per cent. In the past 3 years the mortality rate was substantially reduced (a total mortality of a per cent and a net mortality of 18 per cent) Routine immunization by means of tetanus toxord among the population of tetanus-prevalent areas as effectively practiced by the Armed Services in World War II is highly desirable.

Reduction in the mortality rate would also be furthered by the following procedures 1 Routine administration of prophylactic antiserum (preferably 3,000 or more units) in the treatment of all injuries to patients who have not previously received toxoid immunization. 2 Education of lay people to report early and of doctors to recognize and institute im mediate therapy for symptoms of early tetanus, 3. Immediate intravenous administration of adequate amounts of antiserum 4 Complete excision or débridement of all possible foct of infection in cluding umbilectomy in cases of tetanus neona torum. 5 Adequate sedation. 6 Therapeutic doses of sulfonamides to prevent secondary infection and as prophylaxis against pneumonia 7 Daily intra muscular administration of from 40 000 to 50 000 units of antiserum to all patients in whom the original foci of infection cannot be found or be completely removed 8 Good nursing care. 9 Ade quate calone and fluid intake by means of stomach tube feedings. WALTER H. NADLER, M.D.

MacFarlane, R. G., and MacLennan J D: The Toremia of Gas Gangrene Lescet, Lond. 1945 149: 318.

The clinical features of toremia in gas gangene have been described. A collagenase" has been identified in clostridium welchil toxin and its significance in gas gangrene discussed. The possibility that the general toxemia of gas gangrene is not due to alpha toxin but to the products of thaue break down has again been atudich, particularly in animais. Some evidence in favor of this theory has been obtained. A possible relationship between the toxemia of gas gangrene and that seen in other forms of thock has been noted

MacLennan, J. D., and Macfariane R. G: Toxin and Antitoxin Studies of Gas Gangrens in Man Lanct Lond, 1945, 249, 301

By the lecithovitellin reaction it is possible to make sufficiently reliable titrations of alpha toxin of clostridium welchir and its corresponding antitoxin for observations in the field.

As diagnostic procedures in early gas gangrene neither the lecithovitellin nor the hyaluronidase test has proved satisfactory

In 4 of 27 cases of gas gangrene—almost all of them caused by clostridum welchil—free alpha toxin was detected In only 1 instance, however was a positive reaction obtained with material taken during life. MADIES, M.D.

Hall, I.C.: The Occurrence of Bacilius Histolyticus in Accidental Wounds without Recognized Specific Infection Surgery 1945 18 369.

The comparatively infrequent demonstration of bacillus histolyticus in accidental wounds probably gives an ernocous conception of the true frequency of its occurrence. This bacillus is easily overlooked in a bacteriological examination of a mixed infection of media the organism grows in minute colonies that are likely to be overlooked in a maced culture by all but the best trained and most meticulous bacteriologists. This accounts for the fact that, although widespread in nature, the bacillus histolyticus was not discovered until 1916.

Pure infections with this organism are rare. The typical lesions produced by pure infections of bacillus histolyticus are most often masked in cases with mixed infections and therefore not recognized

The bacillus histolyticus was demonstrated in cultures taken from the debrided tissues in 17 civil wounds. There were 7 compound fractures 5 lac erations 3 gunshot wounds and 2 burns. This was believed to be the first time that this organism was demonstrated in burns. DAYD H. LYDE, M.D.

Willett, F. M. and Weiss, A. Coccidioidomycocis in Southern California; Report of a New Endemic Area with a Review of 188 Cases. Ann. Int. M., 1945, 23, 349.

A new and rather large endemic area of coc cidioidomycosis is reported with this review of 100 cases. The region is roughly triangular bounded by Banning and Needles California, and Yuma Arisons. Following admission of a number of cases of the disease to the March Field Station Hospital repeated skin tests were made on 573 soldiers repre senting both white and colored troops who were performing a dusty type of work at the edge of the desert. In 135 men a change over from negative to positive skin reaction was found Of these men 83 were hospitalized with acute pulmonary coc cidioidomycosis. The remaining 52 had insufficient findings to warrant hospitalization and were eventu ally classified in the clinically inapparent group These findings established the fact that a consider able part of this desert area was endemic for coc cidioidomycosis.

The cases reported here presented no diagnostic problem, since 83 were found as a result of the epidemiological survey and 17 additional cases came from the desert area. The history shows residence assignment, travel, or recent activity in a known or suspected area. A suggestive history in the presence of a pulmonary ailment requires consideration of coccidioidomycosis in the differential diagnosis. By far the greater number of initial infections with coccidioidomycosis are of the inapparent or asymptomatic type. In decreasing order of frequency the symptoms occurring in 100 cases of pulmonary coccidioidomycosis were fever chest pain, cough malaise anorexia, headache pharyngitis, chills cutaneous manufestations, joint pains, conjunctivitis, and hemoptysis. Physical examination is only moderately helpful in the diagnosis. Most of the patients are obviously suffering from a respiratory infection without specific physical findings. Unless there are skin or joint manifestations, the physical signs are not revealing. Roentgenograms are of great help both in the diagnosis and in following the course of the disease. The roenteenological findings may be roughly divided into the following categories (1) varying degrees of parenchymal infiltration (s) hilar adenopathy and thickening (3) fluid (4) nummular densities (s) cavitation and (6) bone

The skin test is probably the most helpful single test when used in conjunction with other aids, i.e. travel history, roentgenograms, sedimentation rate differential blood count, and serological studies. Failure to react to coccidioidin used as an intra dermal skin test in a concentration of 1 100, rules out the possibility of coccidioidomycosus provided suf ficient time has elapsed to permit the individual to develop the necessary sensitivity except in those patients with disseminated infections. Serological studies were of inestimable value both in making a definite diagnosis and in following the course of the disease. Desemination was predicted before it occurred in every case by serological tests on the basis of high titers in complement fixation. This was not based on the reaction to the skin test which in a instance of dissemination was completely negative. The declining antibody titer was used as an index of safety in mobilization of the nationt. The differential and total leucocyte count was of interest mainly because of the cosinophilia, which varied between 5 and 18 per cent of the total leucocyte count. The erythrocyte sedimentation rate was of considerable value being increased in all patients and varying between 16 mm./hr and 46 mm./hr This test was useful both in diagnosis and prognosis. The impression was obtained that spu tum examination in the diagnosis of coccidedomycools is not an entirely satisfactory method of

diagnosis.

Cavitation and dissemination are the two main complications of the disease. The latter is of far greater importance than the former although probably less frequent. In a cases of cavity in white sol

dies one cavity closed and the other slowed a tage tendency toward closure, while in a case of arm in negroes only a cavity closed. Despite the caservative treatment accounted in patients in the activate descendant occurred in patients in the series, descendant occurred in patients in the whom were colored soldiers with complete being the colored soldiers with complete being a large millary dissemination.

The average case of soute pulmonary conclining myonis has an extremely good propose for explete recovery Barring dissemination or compine in a substantial or compined to the propose of the main essential of treatment is adequate before and until the condition is markedly improved the about be be about to be dress. The criteria for notes to duty were based on the clinical findings, not grenograms, sedimentation rates, seriogical states and absence of evidence of dissemination. Bistrative cases are presented.

JOHN L. LINDQUET, M.D.

Ory E. M., Meads, M., Brown, B., Wilcox, C. and Finland, M.: Peoicillin Levels in Seria and in Some Body Fluids during Systems and Local Therapy J Lab Clis. 11 945.59 in

The rational choice of desage and route of sinisistration of penicillin presupposes some acquaintant with the effective concentrations of the antibote which can be attained and maintained at the site of the infection by the different methods. The desired cocentration in any given case will depend, of come, on the susceptibility of the infecting organism. The communication deals with the concentrations penicillin obtained in serum and in certain body fluids of adult medical patients after the admiretration of various doses of commercial penicilia by different routes. The data were obtained about entirely on patients while they were under treatment. The method used is subject to considerable error, but it is adequate for these purposes since it was not intended here to offer any accurate measures of the absorption and fate of penicillin in the body

The concentrations of penicillus which destroy the common bacteria encountered in medical" inke tions were studied by the authors by a very shelp method so that the results are comparable. The indicate that the smallest concentration of pencils which was measured in the present study namely 0.03 unit per cubic centimeter is adequate to stri lize actively growing cultures of almost all strains of the gonococcus group A hemolytic streptococcus about half of the strains of the meningococcus, and a somewhat smaller proportion of the strains of the pathogenic staphylococci. Undoubtedly the scotalbility of the penicillin to the organism and many other factors, most of which are still unknown, cominto play and account for some of the discrepances between the in vitro and in vivo results.

The serum levels of penicillin obtained after virlous doses and intervals during systemic admissitration indicate that for any given dosage only a of levels rather than any specific values can be cted. In general, higher levels are attained and med with the larger and more frequent doses. levels are not directly proportional to the in te in the dose except possibly in any given in dual under constant intravenous therapy Its in patients with cardiac or renal insufficiency cate that the volume of unnary output and the te of the kidney function may materially affect height and persistence of penicilin levels after y given dose. Such patients usually attain and y given nooc. Julia pointile usually access and untain any given level with appreciably smaller acc given at longer intervals than do persons with ormal renal function and those who excrete larger

The problem of whether or not topical injections tre necessary in cases of meningitis, infection of the trons cavities, or walled off focal abscesses will be answered more directly on the basis of clinical re sults than by any analysis of data such as those given in this article. The present observations and similar studies by others indicate that there is some diffusion into all serous cavities but that this is er ratic and usually only slight. Chnically, it is already cognized that these infections after they have be-

me established do not often respond to systemic reatment alone in spite of the fact that bacteriotatic concentrations for the offending organisms can

iten be demonstrated in the exudate. In cases of meningitis there are differences ex presed in the literature, both as to the penetration of penicillin into the cerebrospinal fluid and as to the necessity for having such penetration. Small amounts of penicillin have been found by others in adredual cases particularly after massive systemic ioses. This has not been the authors experience nor that of others who have used larger doses in a greater number of cases. Some cases of bacterial meningitis have been reported as cured without resort to intrathecal injections of penicillin but these cases are not entirely convincing since few if any of the patients had received systemic penicillin as the only specific therapy On the other hand the experience in the authors clinic and in many other cinics indicates that not only is intraspinal therapy necessary but in some instances it is necessary to resort to injections into the cerebral subarachnoid space or even into the ventricle for complete re

The necessity for systemic treatment when peniillin injections are given into infected body cavities sill depend on the circumstances in each case. Some absorption takes place from all the cavities, but the too is erratic and therefore the effective levels are sostained in the circulation for variable periods. Some workers have found the poorest absorption from thick walled cavities and from abscesses which are walled off Obviously therefore if there is evi dence of infection of tissues away from the infected cavity into which the penicillin is being injected systemic treatment is definitely indicated absorption from the cavity may however be ade-

quate to protect against spread of the infection from the site of the injection as a result of the procedure. It is possible that diffusion out of cavities is delayed in some cases when systemic therapy is given at the same time and that may be a reason for using it.

Evidence for this, however is scant. BINJAMIN GOLDHAM, M D

### DUCTLESS GLANDS

The Treatment King B T., and Rosellini L. J of Acute Thyroiditis with Thiouradl J Am

A series of 11 cases of acute thyroiditis is reported in which cure was effected in 8 by the administration of thiouracil. Initially the drug was tried experi mentally on a woman who complained of increased nervousness and irritability and who was found to have an acutely swollen and tender thyroid gland, a temperature of 99.6 and an elevation of the white blood count. After receiving 0.2 gm of thoursed t.l.d. for 7 days she was well and free of symptoms, although the thyroid gland remained enlarged and indurated Continuation of therapy with dosages of 0.2 gm of the drug daily for two weeks resulted in return of the gland to normal size and consistency The patient was subsequently observed for 4 months with no change in her condition.

Although penicillin has not been employed other methods have proved ineffectual in the treatment of acute thyroiditis rodine, rest, bot applications ree bags, and sulfonamides were of no value. Although x ray radiation was found definitely to shorten the duration of the disease varying degrees of hypothy roldism and myxedems have resulted from this procedure in a discouraging number of cases. Bacterial cultures of diseased thyroid tissue removed by surgery have never been positive, but it was inti mated that the possibility of virus etuology of this condition deserved investigation with possible bear ing on the mode of action of thiourscil

Cases for the series were carefully selected 7 cases of acute thyroiditis being included with 3 cases of migratung thyroiditis (the acute process beginning in one part of the gland and spreading to the rest) and I case of Hashimoto's struma Cases of toxic golter suppurative thyrolditis, Riedel a struma and longstanding colloid and adenomatous golter were The diagnosis of acute thyrolditis a clinical rather than a pathological one was made on the basis of enlargement, tenderness and firmness of all or part of the thyroid gland together with the an or part or the thyrone want together what the

In the 8 cases cured the treatment was continued for 3 weeks or less. All of the patients were symptom free in one week, and in all the glandular enlarge ment and tenderness disappeared In 1 case treat ment had to be terminated before the 3 weeks were ment may to be terminated before the 3 weeks were up because of intolerance to the drug but never theless this case was included in the group of cures. In 2 of the 3 other cases treated with thiouracil the

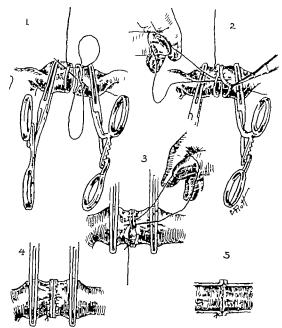


Fig. a. Details of the end-to-end suture of the divided sorts. The sorts is temporarily rotated so that the back wall can be stitched first. s. The back wall is sutured with a continuous, evering stitch that includes the fall thickness of the sortic wall. 3. The sorts is slowed to rotate back

into normal position the back wall enture being consist the stifch is carried around ento the front wall. At anastomosis is complete, the edges of the sorts led everted. S. A cross section aboves that the inchess of it upper and lower segments are in contact with each sh

luminal clotting at the site did not prove to be a serious factor with the method of sutpre illustrated. A serious complication of these operations was hind quarter paralysis. Studies of this complication were made by occluding the aorta in so dogs for varying periods of time, and it was found that paralysis did not develop when the aorta was obstructed for less than 10 minutes. Two human patients have been operated upon't coarctation of the aorta. One of them survived, at the other died with an uncontrollable dilatation of the heart following removal of the clamps. This cmp's sizes the importance of slow removal of the aort clamps.

It is concluded that it is technically feasible remove a narrowed portion of the norta in man a

to re-establish aortic continuity by the method JOHN L. LINDQULET M D described

Crimm, P. D., and Martos, V. F.: Studies in Oleo-thorax. The Bacteriostatic Action of Oils on the Tubercle Bacillus. J Thoras Surg 1945 14

Several of the unsaturated fatty acids have been reported to be bactericidal for the tubercle bacillus In this experimental study the authors found that cod liver oll and peanut oil have no effect on the

virulency of the tubercle bacillus

The difference between these results and those of other investigators may be due to a marked dif ference in the resistance of the bacterial strains used (by the other workers and the authors) to cod liver oil or to a difference in the oils employed. It is possible that the oils available today are more highly purified than those of a decade ago, and have been freed from the substances responsible for the bac teriolytic action.

Gomerol was included in this study because it has been used extensively in disinfection oleothorax Cod liver oil and peanut oil were studied because of the reports of their inhibitory effect on the tubercle bacillus. The authors concur that these oils have an inhibitory action on the growth of the tubercle bacillus. However the subsequent growth of the organisms on a rich medium and their normal viru lence when injected into guinea pigs indicate that the oils adherent to the tubercle bacilli inhibit their growth by a physical rather than by a chemical JOHN E. KIRKPATRICK, M.D.

Crimm, P D., and Westra, J J: Studies in Oleothorax. The Use of Oils in Disinfectant Oleotherax and in the Re-expansion of the Lung in Taberculous Empyema (Preliminary Report) 1 Therec. Surg 1945 14 270.

Ocothorax with peanut oil and cod liver oil has definitely established its value in controlling tuber calous infection of the pleura. Further treatment of the empyema space is determined by the condition of the lung. The authors have found that an deothorax of irritant oils produces an obliterative pleunts and seals over the subpleural foci of infec tion. If the visceral pleura is not too thick and the hing shows a tendency to re-expand, an uncon tuned injection in the lung can be given priority and the objection are continued. When the parenchymal lesion is bealed, the lung may be allowed to re espand. The lung gradually re-expands if assisted by the periodic removal of oil and air if they are present, and by the maintenance of negative intra pleand pressures. If the lung does not re-expand entirely a less extensive thoracoplasty than would otherwise be necessary can be performed. This early use of irritant oils may obviate the mutilating Schede

Is the conduct of eleothorax, frequent examina tion of the patient with periodic removal of pus or fand, and maintenance of negative intrapleural pressures, is mandatory. This avoids empyema or escape of oil through a needle opening and dim inishes the chances for the formation of a bron chial fistula There is great individual variation in the rate of fluid or pus formation, and disappearance of the tubercle bacilli. Oil and a little fluid, with or without bacilli can be present in the chest for an indefinite period without cimical symptoms. One patient with diabetes a very poor surgical risk who had a tuberculous empyema, carried cod liver and pus in the pleural space for 6 years before a bronchial fistula developed. This patient failed to report for aspirations during this time and increased tension helped to cause the fistula.

With electhorax, the surgical problems of aspira tion are diminished and closed drainage with empyems tubes and catheters is eliminated The authors have always considered open drainage con traindicated unless a bronchial or pleural fistula is present. Of so patients with varying degrees of purulent effusion and empyema, 6 experienced reexpansion of the lungs without reactivation of the pulmonary infection or further plastic operation for closure of the pleural space. Of the remaining 14 patients to now have electhoraces which are negative for tubercle bacilli. Re-expansion of a lung may be lifesaving to the patient if a tuberculous infection develops or is present in the other lung as it was in II cases of this series. The use of irritant oils in oleothorax adds a reversible procedure to the treat ment of tuberculous empyema, which heretofore has often demanded an irreversible one.

JOHN E. KIRKPATRICK, M.D.

Zerbini E. D: The Importance of Ascorbic Acid (Vitamin C) in Chest Surgery J Thorse. Surg 1045 14 300-

The closure of the bronchi after partial or total re section of the lung and the gastroesophageal anas tomosis still constitute two important problems in thoracic surgery defective cicatrization frequently occurs in both cases and results in a bronchial or esophageal fistula The surgical technique employed in the procedure is very important in the prophylaxes of these complications and in obtaining a good scar but the technique constitutes only one of the factors influencing scar formation. In many cases it is impossible to obtain a good suturing because of local conditions but even with the best technique the disruption of the sutures from lack of scar formstion, may occur

The amount of ascorbic acid in the blood and in the tissues has been considered one of the most im portant factors in the formation of the intercellular collagenous tissue and in the strength of the scar both in animals and in human beings. The amount of ascorbic acid in some patients was studied by the author before and after lobectomy, pneumonectomy, and esophageal resection. The blood proteins of these patients were tested continuously because hy poproteinemia is another important factor in scar formation which should always be corrected.

The chest condition which brings the patient to the hospital may be responsible for a low plasma ascorbic acid level before the operation. In 22 pa tients examined the average level found just after admission was 0.15 mgm per cent of plasma ascorbic acid (normal considered between 0.8 to 1 2) Only 1 patient had a normal blood level before operation and o patients showed complete absence of ascorbic acld in the plasma.

The operation by itself reduces considerably the plasma ascorbic acid, according to the seventy of the surgical procedure. This level remains low during a long or short interval according to the postoperative

complications and treatment.

The author found that it is possible to maintain an almost normal plasma ascorbic acid level before and after the operation with the administration of 1,000 mgm. of ascorbic acid every 24 hours

The determination of the white cell platelets ascorbic acid gave different results in different patients. When the general condition was good and the patient was a good risk, the white-cell platelet level did not change with the operation, even when the plasma level was zero. In one patient with esopha geal cancer and artificial alimentation through a gastrostomy the plasma and white-cell platelets were both found deprived of ascorbic acid, a condition which represents a prescorbutic state without clinical evidence.

The amount of ascorbic acid in muscle and lung throw removed during the operation seems to be be low the values considered as normal by different

The author draws from his studies the conclusion that all patients with chronic surgical chest conditions should be given high doses of ascorbic acid be fore and especially after important surgical pro-TOTAL K. NARAT, M.D. cedure:

Harper W H., and Blain, A., III: The Effect of Penicillin in Experimental Intestinal Obstruc tion. Bull Jekus Hepkins Herp., 1945 76 2

The purpose of this study was to reinvestigate the role of bacteria in producing death in dogs having holated, obstructed fejunal loops, since antibacterial agents were not available to earlier workers in this field. Potent antibacterial agents, especially pericillin, having no known important chemical or other reaction on the body were used. In studies on the problem of "toxernia" in relation to intestmal abstruction the use of the isolated obstructed loss is valuable because the factors of pancreatic bice. bile and decomposed food substances are elimnated loss of electrolytes and water by vomities a largely obviated and the blood chemistry remains normal or nearly normal. The factors which remain and can be evaluated are the presence of barters stasis, and distention.

In all dogs a portion of jejunum about 12 ca. is length was resected and its blood supply was left intact. Intestinal continuity was restored by endto-end suture. Specimens for bacteriological stain were obtained from the loop, which was then washed free of gross intraluminal material and closed at len ends by inversion. Fifteen dogs received no penicllin therapy and were used as controls. Is 15 ober dogs to ooo units of penicillin in a c.c. of saline soltion were introduced into the loop before it was closed, and 5 additional dogs were given large tors of penicillin intramuscularly starting at the time of

operation. All of the control dogs with foolated, obstructed high intestinal loops died within 61% days. All of the 15 does in whose isolated loops penicillin and introduced were protected for 9 days, while 93 per cent were protected for 13 days, and 60 per cmi were protected for over a month. Five does treated parenterally with penicillin were protected for non then 18 days.

Marked distention of the loop occurring in the presence of bacteriostatic agents is compatible with life. In the absence of distention of the loop as abundant bacterial flora uninhibited by bacteriostatic agents is compatible with life. These experiments indicate that distention must be present before infection of the intestinal wall by the normal

intestinal flora can occur Microscopic and bacteriological evidence a prsented to show that penicillin given prophytictically in large doses can prevent infection of the distended intestinal wall by the normal intestinal bacteria.

JOSOF L. LINDYCHT, M.D.

# **SURGERY**

# GYNECOLOGY AND OBSTETRICS

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### LEIOMYOSARCOMA OF THE STOMACH

Its Roentgenologic and Gastroscopic Diagnosis and Its Possible Relation to Pernicious Anemia

RUDOLF SCHINDLER M.D OLOV A. BLOMQUIST M D. HAROLD L. THOMPSON M D. F.A.C.S. and ARTHUR M. PETTLER M D. Los Angeles, California

TEIOMYOSARCOMA (leiomyoma malignum) is one of the rarest tumors of the stomach. It has been reported (7, 21) to comprise only 10 per cent of all gastric sarcomas. Since the frequency of sarcoma as compared to carcinoma of the stomach is said to be only 1 too only one leiomyosarcoma should be expected to 1 coccess of gastric carcinoma. Because we have observed 4 cases within a relatively short period of time, we feel that this statistical data may be misleading and that leiomyosar coma may not be so rare as has been previously reported

The diagnosis of this tumor is important because of its good surgical prognosis. The surgeon who may be inclined not to operate on large infiltrative carcinomas must never theless, consider the presence of a leiomy osar coma which has a favorable prognosis and should not refuse to give the patient a chance as long as this tumor cannot be excluded

It would be most desirable to make the differential diagnosis before laparotomy. The tases observed by us were all examined fastioscopically. Although gastroscopy did not lead to the exact diagnosis the publication

From the Department of I ternal Medicioe, College of Medical Evangelists, and the Los Angeles County Hospital, Los Angeles. of gastroscopic observations made on these patients seems to be justified because they may aid in better evaluating the gastroscopic findings in the future

We have collected a total of 94 cases of gastric leiomyosarcoma from the literature Sixty-eight of these cases were published by Chaffin in 1938 and since then at least 26 additional reports have appeared

#### PATHOLOGY

The differentiation of leiomy sarcoma from beingin leiomyoma is not easy. Transitions are to be expected theoretically. Cases have been described in which microscopically beingin looking tumors had metastasized and thereby unexpectedly behaved like malignant tumors. Bormann comments on this fact by saying

Thus we cannot always recognize whether or not certain cells are malignant. Aone of the 4 cases of our own can possibly be called a simple benign leiomy oma inasmuch as they all show expansive growth not encountered in the simple benign myoma of the stomach

Benign myoma of the stomach occurs fre quently Rieniets found 43 leiomyomas in 32 stomachs in 200 consecutive autopsies. These submucosal tumors are usually small and shamly circumscribed. Some may grow sub-

serously others may grow toward the mucosa and finally protrude into the lumen of the stomach. They may become firmly fixed to the mucosa which often presents deep ulcera tion however the sharply limited rounded character of the tumor and the fact that it obviously belongs to the submucosal tissue makes it possible to recognize it grossly at once. The evenly rounded character of the tumor effects a recession between its surface and the surrounding mucosa. The recession is crossed in a characteristic manner by mucosal folds which if found all around prove that the tumor does not grow infiltra tively toward the surroundings (10) Although transitional forms may occur it may be stated that in none of our four tumors did the gastroscopic observation reveal the typical picture of submucosal benign myoma. Microscopi cally the benign leiomyoma is composed of highly differentiated smooth muscle fibers.

Frequently malignant leiomyomas will not form metastases for a long period of time, but they quickly break their natural boundaries, grow expansively and partly infiltratively and prove to be fatal The infiltration never reaches the degree found in infiltrative carcinomas. and frequently a limiting capsule is still present Occasionally bridging folds may be seen (see our Cases 2 and 3) but they are much less marked than in benign tumors and usually are present only in a small portion of the circumference of the tumor Most leiomy osarcomas are probably malignant from the beginning on, although sometimes sudden rapid increase in size of a long quiescent growth, with ensuing cachema may be observed Microscopically the muscle cells of these tumors are not so fully differentiated and evenly built as they are in benign leiomy omas. The fusiform cells may be shorter or rounded and irregular in form and show many stages of differentiation of the smooth muscle cell and mitotic figures in changing number may be found.

It is known that there are several gross forms of leiomyosarcoms (all of which were encountered in our own material) They may grow into the lumen of the stomach and may then even become pedunculated (Case 3) they may expand within the gastric wall

(Cases 1 and 4) or they may expand into the omentum or neighboring structures (Case 3). There is as little explanation for these different types of growth as there is for the different gross forms of gastric carcinoma. Unceration of the mucosa covering the tumor is frequent in all forms.

The differential diagnosis between lesonyosarcoma and lymphosarcoma is particularly important because the lymphosarcoma reacts so well to x ray treatment (Buschke) while the leiomyosarcoma requires surgical treat ment. In most cases these two forms of par comas should not be confused easily the lymphosarcoma usually infiltrates the entire wall of the stomach, diffusely involving the entire organ (Bockus Schindler 15 16) although sometimes solid circumscribed tumors may occur (13) The leiomyosarcoma grows more expansively but less infiltratively Er ceptions may occur here too so that mucroscopic examination of a biopsy specimen is finally the best method for institution of adequate therapy

The differentiation between leiomyosarocca and carcinoma is more difficult. It has been said that on palpation the leiomyosarocca has a rubbery consistency as contrasted to the stony hard palpatory sensation caused by carcinoma yet the gross differential diagnosis may be impossible.

Metastases were found in 15 per cent of our collected sense. Cameron reports 205 per cent, but figures as high as 70 per cent appear in the older literature (Crohn) Metastase occur most frequently in the liver even without evidence of tumor formation in the regional lymph nodes. They occur but rarely in the lungs and bones. The metastatic liver tumors may grow only slowly Lemon and Broders have seen a patient live 6 years with a metastatic nodule in his liver

#### CLINICAL FINDINGS

The three cardinal findings are (1) gastrointestinal hemorrhage leading to anomis (2) opigastric or left upper quadrant pain (4) upper abdominal mass. Each occurred in about 50 per cent of the collected cases. Gastrointestinal bleeding is frequently severe and recurrent. The abdominal pains vary from a vague distress to a severe ulcer like type of pain The abdominal mass may sometimes fill the whole abdomen.

Nausea and vomiting do not occur fre quently Weight loss is usually only moderate in amount.

A ray examination and gastroscopy should at least reveal the presence of a gastric tumor. The most important findings will be described in the histories of our own cases. The difficulty in making of the x ray diagnosis will become apparent from our Cases 2 and 4

In the collected series x ray examination revealed a filling defect in 59 per cent an extrinsic mass was suspected in 18 per cent shiftness of the gastric wall was described in 11 per cent presence of ulcer niche without filling defect in 8 per cent and in 4 per cent a negative gastrointestinal series was reported. In one case the correct diagnosis of leiomyosarcoma was made and this case will be dis cussed later in detail

There are but few gastroscopic reports. Twice (5 9) the tumor was overlooked at gastroscopy. Lemon and Broders stated that postsurgical recurrence of multiple leiomyosarcoma was seen gastroscopically. The first gastroscopic description of a leiomyosarcoma was given by Schindler and Letendre in 1942 (18).

#### CASE REPORTS

CARE I The gastroscopic pacture of this case has been previously described (18) L. Q a white male 26 years of age, was seen on October 22 1940 at Billings Hospital, Chicago (Unit No 251259) For 3 years he had had gnawing feeling in the epi gastrium and attacks of weakness after exertion. Once he had fainted He had been treated for per nicious anemia the blood count showed red cells down to 2 800,000 and seemed to have responded to liver treatment.

Physical examination revealed no abnormalities except some pallor. Hemoglobin was 117 6 grams red blood cells 4,000,000 white blood cells 9 000 gatric analysis showed 40 units of free hydrochloric acid after histamine.

Notember 4, 1040 x ray examination of the stom ach (Frederick Templeton) revealed the presence of large neoplastic masses. These seemed to be beings but they were so large that one cannot be sure that they are not malignant. Spectacular degree of polyposh.

overmber 6 1040 gastroscopic examination (R.S.), report follows: "The whole stomach was seen and the picture was one which I have never seen before (Fig. t). The angulus was seen and below it there



Fig 1 Gastroscopic picture of leiomyosarcoma. Case 7: Tumor masses protruding from the posterior wall covered by smooth soft mucosa. At 4 o clock longitudinal ulcer ation. At the left side atrophic gastric mucosa with blood vessels.

was a soft protruding mass which filled almost the entire antrum. The mucosa covering it showed many dark creases and folds. A dark hole in its upper portion seemed to be the way to the pylorus Although this mass was unusually soft. I would not be able to exclude a malignant tumor from this picture alone. But then other protrusions were seen—5 along the posterior wall and 3 along the lesser curvature. Those of the posterior wall were large hemispherical protrusions which however, sloped gently toward the gastric wall. They all were covered by a smooth and soft mucosa and no stiffness was observed. However the highest of them lying in the fornix, had a somewhat different appearance. Its surface was nodular and had a definitely polypoid character. The three protrusions of the lesser curvature were smaller the two lower ones having about the size of a cherry and the highest the size of a plum. They were covered by smooth mu cosa. Their elevation was partly so that a shadow was cast on the surrounding mucosa but in other portions of the circumference there was a gradual sloping The uppermost of these three formations contained many nodes of different size and if we had seen this one alone we would not have been able to differentiate between a benign and a malignant adenoma. Its combination with many other tumors speaks for a benign polyposis. The mucosa sur rounding the highest of these tumors and of the whole upper third of the stomach was grayish in color with branching blood vessels. It should be mentioned that in the groove between the highest and the next highest excrescence of the posterior wall there was a dark red small depression which might or might not have been a small ulceration
'Impression (1) polyposes (2) atrophic gastritis

'Impression (1) polyposes (2) atrophic gastritis of fornix (3) it is impossible to exclude malignant degeneration of the stalks of the nodes

On November 11 1940 an explorators lapar otomy was carried out (Dr. H. P. Jenkins). The

Gastroscopic pictures drawn by Miss Eve Vermonde.



Fig. Gross specimen. Case. Nodula mass i post erior wall and lesser curvature. Ulcer

at much was opened extensive tumor masses within the wall of the stomach were found. A biopsy specimen of one. I them was taken. Its microscopic examination revealed leiomyosarcoma. Thereupon

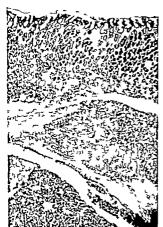


Fig. 5. Photomicrograph, Case t Survey Section through rather normal gustric mucoss and adjacent tumor

a course of x-ray therapy was given with a total of

On February 21 1911 a second operation as performed (Dr Lester Dragstedt) No change was found in the size of the tumor masses as compared with that at the first operation the x-ray irradiation had been ineffective. Gastrectomy spherectomy partial pancrestectomy and esophagogastrost my were extract out. The patient recovered. He received hiver treatment and was doing well on September 6 194.

Gross specimen. The gross specimen consists of the earlier stormach, splene, and a small protition of the tail of the paneress. The stomach contains a large firm mass in the posterior wall and leave curvature—10 by 6 by 6 centimeters (Fig. 2). It is socialar and firm but not hard. It is serous is foster and the muccan is also intact, except over one large protuberant node where it is ulcerated the floor of the 1 centimeter-sized ulcer penetrates for at least 5 centimeters into the tumor mass. Over others of the nodes there are small areas of hemorrhage in the muccas. The cut surface of the mass is firm, white with a slight themorrhagic discoloration at the center.

Microscopically (Fig. 5 and 4) the tumor miss is composed fround and spindle cells with a moderate amount of cosmophilic evtoplasm. There is a slight degree of marphasa of the tumor cells. Malkey stain reveals only a very fine reticulum in the tumor mass. Phosphotungstie sich demotorylin stain shown no myofibrils. There is very little difference between this specimen and the bloops premierable in the properties of the prop

Summary A 15 year old man had been treated under the diagnosis of permicious anemia but x-ra summaton revealed large tumor muses of the tomach. Although malignant growth was caldered the diagnosis of polyposis was made. The same diagnosis was made at gastroscopy although errospectively it must be admitted that the picture.

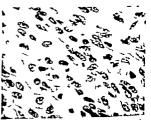


Fig. 4. Photomicrograph, Case High power Irregular succometous tissue. Some typical smooth muscle cells.

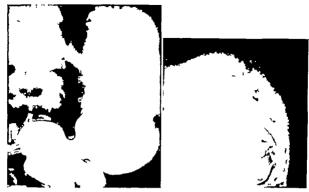


Fig. 5 Case 2 a., left, Roentgenogram taken before gastroscopy with complete filling no pathology demonstrable b, 'Mere gastroscopy—relief method' Shallow filling d'fect of lesser curvature with niche formation. Two fistulas extend into the depth of the tumor

described in the gastroscopic protocol (never een before—") was not consistent with the diagnosis of rolippoils the possibility of malignant tumor was considered. A biopsy specimen taken at an explorative language of the protocol provided by the protocol protocol

CASE 2 A S 50 year old white male No 864521 entered Los Angeles County Hospital on December 21 1043 with the history of melena which had occurred 24 hours before. In the afternoon of that day he suddenly felt sick mauscated and vomited a cupful of dark blood. For 10 years he had vague abdominal di tress occurring hours after meals and felieved by food. There had been no recent weight loss.

Physical examination revealed a well developed well nourished male. Slight pallor of the visible mucous membranes was present. There was mild epigastric tenderness but no mas was felt. The kemoglobin was 50 per cent. Occult blood was found in the feces.

On January 26 1944 the patient after bed rest dietary treatment and transfusions had recovered so much that x ray examination seemed permis ible

First ray examination The upper gastrointestinal series lid not show anything all normal (Fig. 5a) except spasticity of the duodenal bull consistent with early shallow ulcer. This diagnosis seemed chileally acceptable and the patient was in such a mod condition that his discharge was planned. He

was een by one of us in consultation however and advice for gatroscopy was given in order to determine if possible the true origin of the bleeding

Gastroscopy was done on February 11 1044 by Dr David Niemitz and one of us (R S) (l'ig 6) The instrument encountered resistance at first at the cardia which was suddenly overcome and the instrument went into the depth of the stomach The angulus and pylorus were in the two o clock position and a picture was even obtained in the three o clock position. There was some duliness and formation of nodules in the lower anterior wall. As the instrument was withdrawn a hemi, pherical tumor entered the visual field at the six o'clock position (see Fig. 6) It was covered with smooth very nale mucosa No ulcer or necrosis was seen. Higher up the tumor was so close to the instrument that no detail could be made out. The tumor extended up to the cardia was 8 centimeters in length Im pres ion (i) tumor of greater curvature and nos terior wall below the cardin Carcinomi is most likely however a benigh tumor especially myoma may be present (2) di torth n of the lower portion of the stomach (3) mild hypertrophic gastriti of the lower portion of the stomach

Because of the tumor seen a repeat x ray examination was uggested

Second x ray. At this second examination. Feliciary 16, 1944, care was taken to examine the relief of the murosa and the patient received only one swallow of barium (1 ig. 5b). Two niche like pritui lons are seen on the posteromedial side of the stomach at the junction of the proximal and mid-lie.



Fig 6 Gastroscopic picture Case I the upper third of the stomach a cound mostle tumor was seen protruding from the greater curvature and posterior all

third These measure a continuous as length and a obbly repressive a perforation which is rice. I sisgost as pic findings could be into a se plans. The ringal pattern of the stomach is essentially normal (except in the area of the niches) but the cardiacend of the stomach appears to be displaced laterilly and anteriorally by a soft mass. The findings are consistent with a perforated gastric ulser with an adjacent inflammatory mass or—less likely—perforati n into a carcinoma.

forati n into a carcinoma

As the gastro-copic diagnosis of a tumor seemed perfectly reliable surgery was advised

Operation was performed by Dr. H. Schiffbau r on February 2, rough Varge tumor mass of the posterior wall was found. Total gastric resection proved feasible. The spleen was removed. The tumor was found to be firmly adherent to the tail of the pancreas so that resection of the tail of the pancreas were found.

The patient survived the operation a week lat r was in excellent condition, and made an uneventful recovery. He reported on September 10: 1944, that he felt fine. There was no recurrence of bleeding or fany gastrointestinal distress.

Gross pathology The gross specimen is pictured in Figures 7 and 8 Figure 7 show the resected apleon tail of pancress and the posterior wall f the stomach containing an irregularly round tumor with node formation measuring 12 by 10 by 65 centimeters. In Figure 8 the upper half of the st. m. ach has been opened across the anterior wall. In the posterior wall toward the lesser curvature there is an irregular ulcer 5 by 6 millimeters in size Obviously thus alcer corresponds with the niche formation observed at the second x-ray examination (Fig. 5b) and it was missed gastroscopically because of its location in the well known "blind area of the posferior wall (16) Close to its lateral margin a smooth munded protrusion can be seen. It is caused by a node of the tumor and was seen and diagnosed at the gastroscopic examination. In the picture f the gross specimen there are bridging folds at the



Fig. 7 Gross specimen. Case Posterior surface. At left is the spiren, at right the expansively growing belongssurcome of the upper portion of the stomach, beneath it (crossing the stomach) the tail of the pancreas.

lower pole of the tumo. Unfortunately at gistrocopy the tumor bulged so much that the lower recess with these typ cal folds was not seen. The largtumor is found at the left side of the picture. It extended into the gastrocolic omentum and into the paincreas

Microscopically the typical pacture of leionysarroma is seen (Fig. o). At some places rather replar smooth muscle cells are found. But in other places the cells are irregular colony is under inhave the characteristic regular colonytion with rounded edges of the normal nucleus of the smooth muscle cell. Most of them are oval or round, of various sizes and mitoses are observed. Most portions of the gastric mucous (except that of the ulter area) of the muscularis mucoase and even of the submucoase overling the tumor are perfectly normal.

Summery A latipe lecomyosarcoma was found in a 56 year old male which probably had developed yer a period of about ten vean and had caused only mild epiganization. At the first x-ny examination the timor was overlooked because no rel if technique was used. Gastroscopy revealed the presence of the tumor but she picture as seen was not racily that of a carcinoma because the surface looked unusually smooth however: I did not correspond with that of a benign myoma because the tumor extended did fusiely toward the cardia. A second x-ny cannitation with relief technique revealed an ulcer nuck At surgery a lelomyosarcoma was found growing

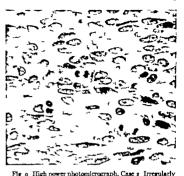


Fig. 8. Gross specimen. Case 3 Anterior view. Upper two-thirds of stomach opened across the anterior wall. At the left side the huge tumor at right upper corner the spicen. The inside of the stomach shows the ulcer demostrated by x-ray on Figure 5s, and the tumor protrumon sera at gastroscopy (Fig. 6).

expansively into the omentum and pancreas. Total gatherctomy with exturpation of the spleen and the tall of the pancreas led to cure which because of the good limitation of the tumor and the absence of metastasis may be permanent

CASE 3 W B a 60 year old white male No 104075 entered the White Memorial Hospital Los Angeles on July 11 1943 complaining of increas ing weakness for I year For 8 months he had suffered from distress in the left epigastrium occur ring 4 hours after meals and which was promptly relieved by eating About 2 months prior to entry he became dyspneic on mild exertion and noticed numbness and tingling in his extremities Physical examination revealed marked pallor of the mucous membranes The liver edge was felt just below the costal margin No abdominal mass was felt and there was no tenderness Hemoglobin was 63 grams red blood cells 900,000 color index 20 eucocytes 3 900 reticulocytes o 5 per cent Gastric analysis failed to reveal any free hydrochloric acid with the histamine test

A tentative diagnosis of pernicious anemia was made. Treatment with parenteral liver extract was begun and 6 days later the reticulocytes rose to 22 per cent. After 8 days the hemoglobin rose to 88



formed sarcomatous cells. Alitoses.

grams red blood cells 1 960 000 and leucocytes 8 500

The first x ray examination of the stomach was done on July 15 1043 (Dr Stilson) with the following report. The stomach is of average tone. The major portion of its lumen is regular and flexible. The cardiac end of the stomach however on the film appeared rather peculiar and it is evident that the stomach empties rapidly. Probable neoplasm of the cardiac end of the stomach.

The second x ray examination was carried out by Dr. W. L. Stilson on July 19, 1944, after the first gastroscopy. The report read. Now there are demonstrated definitely fluoroscopically and on the films extensive filling defects involving the proximal portion of the stomach, except the extreme cardia and extending for a distance of approximately 9 centimeters. The lesion apparently arises about 3 centimeters distal to the cardia.

The x may pictures are partly rendered in Figures to and 11. In Figure 10 only the colon is filled with contrast meal but the stomach is empty. Here a tumor can be seen very well as a shadow within the air bubble of the stomach. Figure 11 demonstrates the large filling defect in the barium filled stomach One should notice that no central crater is definitely wishle though the barium accumulation at the lesser curvature side of the tumor may be interneted thus.

Two gastroscopic examinations were carried out. First gastroscopi (O.A.B) on July 18 1944. The poloric end of the stomach was well seen and several peristalitic waves could be seen running down to the pylorus the entire circumference of which came into view. Just above the angulus along the les er curvature there were 2 or 3 rather prominent folds which seemed to be somewhat redder than the surrounding nucosal which was extremely pale. About 5 or 6



Fig Case 5. \ coal of the colon is filled. The stomach is empty. The tumor is outlined toward the dark back ground of the gastric air hubble.

centimeters above the angulus on the anterior wall extending down to the greater curvature a well defined mass could be seen. This mass was very red and succulent in appearance in contrast with the extremely pale surrounding mucosa, and there seemed to be several finger like processes. When the instrument was withdrawn the large red mass came in contact with the objective and it was impossible to see its uppermost portions Mong the posterior wall and greater curvature in the lower part of depth II, blood could be seen lying between the rugal folds but no point of active hemorrhage could be seen. In all portions of the st much which were observed the mucosa was extremely rule almost to the point f whiteness

Impression (1) carcanoma of the stomach in volving the anterior wall and greater curvature of the upper and midportions of the stomach. (It was mpossible to visualize the margins of this tumor mass and hence I cannot be certain that it does not extend all the way up to the cardia! (2) no gastnts seen."

Second gastroscopy (O.A.B and R.S.) n July so 1043 Immediately with the objective turned to nine o clock extensive pathological changes were seen. A stiff protruding are budged into the cavity of the stomach from its antenor wall involving the greate curvature also. At its deepest point there was a dark red protuberance and to both sides of this protuberance was a less dark will surrounding the stiff area. This wall hung over in a mushroom-like fashion and pale pink, soft normal nucosa was submerged beneath the margins of the mushroom like wall. On the top of the stiff elevation there was extensive white necrosis or ulceration. When the instrument was withdrawn the infiltrated area cam.



Fig 1 Case 3. Stomach filled. Treadelenburg position Large filling defect.

close to the objective. The wall, however could be f llowed all around the lesion. It became much thinner in the upper portions of the stomach but remained sharply limited from the urrounding pale mucosa t which its dark color f rmed a decided contrast. In thi pale mucosa no ign of atrophy no thinning, and no blood vessels were seen. Toward the upper edge of the wall several mu asal falds e f them unning up t the wall n manner usually o ly seen i s bmucosal t mors (see Fig 12) There was no infiltration The upper limit of the wall was found to l 6 centimeters below the cardia Impression ( ) large carcinoma of the anterior wall and greater curvature of the body of the stomach (This is most likely a Type II carcinoma according to the classification of Borrmann These Type II carcinomas usually give an excellent surgical prognosis ) (2) No gestritis visible

prognosis 1 (2) No gestricts visible.

On July 3 1044, a gastric resection with anterior Pólya anastomosis was performed leaving only a mall amount f the subcardial portion of the stomach (D. George Thomason). The patient recovered.

The gross specimen contained a pediusculated tumor of the ca date end of the st mach This pediunculation is not well demonstrated in the picture of the gross specimen (Fg 13) which demonstrates more the ga troscopic aspect The tumor as 6 centimeters in diameter. Its surface was rough, inequalar and contained three large ulserated area. A Type I Borrmann carcinoma was disguosed at gross inspection.

Microscopically the tumor consists of smooth muscle tissue The cells re partly regular and well



Fig. 13 Gastroscopic picture Case 3 At the left lower margin the fold of the cardin is seen. It is separated by nor mall mecoas from the upper edge of a tumor. The protrud ung tumor has a nodular wall and contains a large uncerstion Note especially the one "bridging fold running from the sormal mucosa up to the tumor wall because of its diagnostic agnificance."

differentiated partly pregular in form and without complete differentiation (Fig. 14). Scattered be treen the solid tumor masses are nests of plasma cells and macrophages. Where the tumor pierces the mucosa there is no sharp capsule. The neighboring mucosa shows some cysis at the bottom of the glands.

The mucosa of the anterior wall and lesser curva ture distant from the turnor shows mild but definite changes The interstitum between the long body glands contains few cells mostly plasma cells and fibroblests. The muscularis mucosae itself is split up Between the muscle fibers are inflammatory cells Most of the body glands are normal but some pits are proliferating toward the depth and at a few places metaplasia into an intestinal type of epithelium is seen. The surface epithelium shows mild but definite proliferation and between the pits there is some slight edema. Thus there is a mild but definite atrophic gastritis present (It may be said here that this picture in our opinion is compatible with the diagnosis of pernicious anemia. It is of in terest, furthermore that this mild degree of atrophic gastritis was not recognized at two gastroscopies)

Six months later the patient complained of swell ing of the legs and of anorexia but under continued liver treatment the distress disappeared The blood picture remained normal. However the patient was constantly treated with liver injections.

A third gastroscopy was undertaken on July 23 1944 (O.A.B.) The gastroscope entered the jolunum no tumor was seen. The gastric mucosa looked pretty normal but toward the cardas there was some thinning with blood vessels—atrophic castrititis—not seen at the previous gastroscopies

The patient was last seen in March 1945 at which time he felt quite well. Repeated x ray examinations have failed to reveal any recurrence of the tumor. There was immediate emptying of the stomach stume.



Fg 13. Gross specimen Case 3 At the right ade of the large tumo there is extensive ulceration. The pedunculation does not show

Summers In a 60 year old man the fully developed picture of pernicious anemia was found macrocytic anemia with a color index of 2 typical reticulocyte response to liver therapy and histamine proved anacolity Nave examination and gastroscopy revealed a circumscribed tumor of the upper third of the stomach without gastritis. In the gross

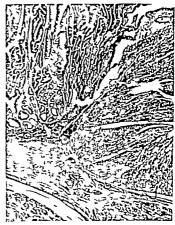


Fig. 14. Photomicrograph Case 3. The gastric mucosa contains cysts and "cosk-screw" glands,—first signs of atrophy. The myomatous tumor at its break through the atomach wall has no capsule



Fig. 5. Case 4. Roentgenogram interpreted as normal. However i the fornix a contour and fleck are seen which may be interpreted as the outline and central ulcer of the tumor

resected specimen this tumor was found to be a pedunculated one but only at microscopic examina tion was the diagnosis of lelomyosarcoms made Retrospectively it must be admitted that the second gastroscopic examination (Fig. 12) had revealed a feature which should have been considered as almost incompatible with the picture of gastric carcinoms namely the presence of a bridging fold as de scribed previously (10) as characteristic of submu cosal tumor. The very large ulceration and the high dark red wall surrounding the ulceration reminded one so much of the frequently observed pictures of gastric carcinoma that the importance of this one fold for the correct diagnosis was underestimated although the gastroscopic protocol stated the presence of such a bridging fold "usually only seen in submucosal tumors

The tumor was removed by extensive resection and the patient is living now in satisfactory condition Of special interest is the blood picture obtained in this case. It will be discussed later

in this case. It will be discussed after CASTA & T as dy year old Ethiopian female entered the Los Angeles County Hospital on January 16 supt. One year before admission she had had hematements followed by occasional passage of black stools. She noticed increasing constipation and a weight loss of 60 pounds Three weeks before

entry she became weaker and dyspnene. Repeated melena was observed. Twelve days bef re admission she vomitted one pint of dark blood She had had only a little epigastne distress

Physical examination revealed an obese colored woman, with pallor of mucous membranes rules at the base of the left lung and a systole murant over the mitral valve. On palpation of the abdomen no masses were felt. Gastric analysis revealed 8; units of free hydrochloric acid after hustamine.

A ray examination, February 30, 1941 revealed the following Esophagus and stomech did not reveal any abnormalities. There was a normal 6 keer progress. The duodenal bulb was smooth The bemoglobin which was 1; per cent on entry was brought up to 70 per cent after numerous transitions on March 10 1941 the patient was dicharged with the diagnosis of gastrointestinal hemorrhare of unknown reloctory.

She re-entered the hospital on June 28 1411 because of melena. The hemoglobin was down to 18 per cent On July 12, 102 x-ray examination was again undertaken. Normal six hour programs and stomach essentially negative. The duodenal builb is arrall, but showed smooth ordinar flavorscopically. No tenderness irritability or pra-

Gastroscopy (H.I.T.) was carried out july 3, 104 and the report follows: Pylorice and of stomath normal in color and configuration except that there were multiple small pigmented bemorrhagic area in the proximal portion of the body there was a large necrotic ulcre with a fungating hyperplated edematous margin typical of cardiomas. The high position and large size of the lesion makes its open bulty questionable. In view of the otherwise god general condition of the patient, surgical exploration is probably advisable.

ray films were taken again on July 35, 1941. Then a constant filling d feet of the cardac ended the stomach on the greater curvature side constant with a polypoid neoplasm probably cardioma. Who wever Figure 16 that 2-ray examination is studied the conclusion may be dran that there is a tumor of the cardiac end of the stomach with a central uleer. The a guificance of this picture will be discussed later.)

On July 31 1941 total gnatrectomy with splene tomy and partial pancreatectomy was carried out (Dr Harian Shoemsker) The patient deel post operatively on August 3 1941 from massive pulmonary attacketsasis

The gross specimen consisted of the excised stomach which contained in the upper posteror wall a critilaginous-looking mass measuring § by 17 by 4.5 centimet is with a large mucosal der fits central portion. The turn r had grows or pansively beneath the mucosa and extended to the

serous forming there a knobby projection
Microscopically there are intertwining bands of
elongated apridle-shaped cells. Few mitotic figure
are seen. The regional lymph nodes do not contain



Fig. 16. Case 4. The diffusely infiltrative leiomyosarcoma has grown destructively into the gastric mucosa Signs of alrophy

any tumor cells Figure 17 shows that the tumor invades and destroys the mucosa which contains only remnants of glands. Some of these may still be seen within the tumor tissue some show cystic dilatation.

An autopay was performed by Dr. L. K. Andersen Massive attlectasts of the lungs was found. In the liver there was a firm nodule 2 centimeters in dia meter on the posterior surface of the left lobe Microscopically it proved to be a lenomyosarcoma metastasis (Fig. 17) without capsule

Sammary A 46 year old woman had had severe statacks of hematemests and melena for over a year. The source of the bleeding was not found after the first admission and would have been overlooked at the second admission without gastroscopy. With this method an ulcerated tumor of the upper portion of the stomach was seen and interpreted as a carcinoma Suggry revealed an intramural leiomyosarcoma Suggry revealed in intramural leiomyosarcoma protain gastrection with splenectomy and partial sancreatectomy was performed. The patient died makive pulmonary at lectuasis. On autopsy me small metastatic node in the liver was found

#### DISCUSSION

A brief discussion of the x ray diagnosis sestimacopic diagnosis relationship to permi lous anemia, and therapy of leiomyosarcoma of the stomach follows

X ray diagnoss: In our material the diag loss of a gastric tumor was missed at one tray examination in Case 2 and at two x ray raminations in Case 4. In these 2 cases the

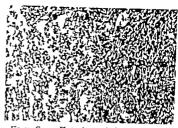


Fig 17 Case 4. Photomicrograph showing liver metastasis. At left liver tissue. At right leiomyosarcoma tissue without captule.

presence of a gastric tumor was found at gastroscopy. This rather poor result can obviously be improved. In both cases the tumor could be demonstrated at a repeat x ray examination when the proper technique was used. These 2 cases prove again the fact that the method of filling the stomach completely with barnum suspension and then taking films is unsatisfactory. It must be replaced rou tinely by the relief method (22) With this method the relief of the stomach is studied and much finer lesions than those found in Cases 2 and 4 will not be overlooked.

The diagnosis of benign submucosal tumor at x rav examination can be dared if a sharply defined round filling defect with a central niche is noted The central niche is charac teristic of the central ulceration so frequently found in these tumors However in leiomyosarcoma it may be more difficult to state that this tumor originates from beneath the mu cosa i e from the submucosa or muscularis propria A case report published by Chaffin however shows how astonishingly correct diagnoses become possible if proper technique and deliberate interpretation are used. The x ray examination in that case was carried out by Dr D R Laing of Pasadena and the x ray protocol (May 28 1936) read

The stomach is somewhat hypertonic. Near the junction of the distal and middle thirds of the stom ach is an area approximately 55 centimeters in diameter which is not covered with barrum except for an area 2 centimeters in diameter in its approximate center. There a few radiating lines extend from this center pocket of barrum to the proliferation

of the rounded lesion. The stormach was very pilable. Perstaltic waves mored over very freely and were only lessened in this region to the extent that the lesion impinged on the respective curvature. The rugal pattern was untact except in the area occupied by the lesion. The center of the lesion could be empitted of its barium by palpation. There was no tenderness in this lesion. The duodenal hubb filled readily and moothly. The findings are suggestive f1 omy ma with central necross, which may be due to sarcomatous degeneration. The post fibilities f localized hypertrophic pastic mucers or a large polyp with central ulceration or umbilication must also be considered.

Here proper interpretation had lead to the correct diagnosis of a submucosal tumor. The central ulceration seen was interpreted in favor of sarcomatous degeneration. This is not correct. Perfectly benign submucosal tumors of every kind even lipomas, may have similar central ulceration. In this case, however definite leiomyosarcoma was found microscopically and the fact remains that the roentgenologist had stated correctly that a malignant tumor of the atomach had originated from the submucosal lavers.

If we review critically the x ray protocols of our 4 cases, then we may say that in Case 1 probably the correct diagnosis of a tumor originating submucosally was impossible Large neoplastic masses were seen they appeared beingin but malignant growth could not be excluded. However, at the examination of the excised gross specimen an ulcer was found and the floor of this ulcer penetrated for at least 15 centimeters into the tumor mass. This indicates a kind of fixtula formation. Such a fistula might have been seen at x ray examination. In carcinoma this feature is observed rarely if ever

Case 2 shows that this sign may be demonstrated at the x-ray examination of leiomyosarcoma. At the second x-ray examination the picture rendered in Figure 5b was obtained A shallow filling defect is seen with an ulcer inche formation. Two fixtulas extend into the depth. Each of these fixtulas has a leight of 2 centimeters. They were described well in the x-ray protocol. In consideration of a similar picture in the gross specimen of Case. I we conclude that filling defect with central niche and fixtulas at x-ray examination is rather characteristic of lelomyosarcoma.

In Case 1 the tumor was at first seen best as a round shadow within the gastric air bubble. Later a round filling defect within the banum was seen. The diagnosis of submucosal tumor was impossible at xay examination because the tumor protruded into the mucosa and was pediunculated. We do not believe that at x ray examination the differentiation from carcinoma in this form of leisomyosarcoma is possible.

In Case 4 two x ray examinations had failed to reveal the tumor. After gastroscopy at a third x ray examination. Polypoxd neoplasm, probably carcinoma was found. But if we look at this picture (Fig. 15) then we see a central niche within a tumor of the fornir and this central small crater may have sig gested perhaps presence of a submucosal tumor.

Thus we come to the conclusion that in 3 of our 4 cases the x ray diagnosis of a submucratil tumor would not have been entirely impossible. It must be admitted that in some cases (as in sur Case 3) the differentiation from carcinoma at x ray is impossible but the x ray syndrome of filling defect plus central niche plus fishets should be considered as highly suggestive of lenomyosarcoma

Gastroscopic diagnosts. In none of the a cases was the correct diagnosts made at gastroscopy but in 2 of the cases (Cases 2 and 3) features were described in the gastroscope protocols which had a certain relationship to submucosal tumors, and this relationship had been stated.

If we analyze the gastroscopic pictures of the 4 cases, we find that in Case 1 the gastroscopic protocol offers no foundation for the final diagnosis of polyposis Thegastroscopic findings correspond with every feature later found in the gross specimen This gross specimen has no similarity to the well known picture of gastric polyposis. The protocol states that in the antrum a soft, protruding mass was seen Other large hemispherical protrusions were described which sloped gently toward the The elevation of other small gastric wall protrusions was 'partly so that a shadow was cast on the surrounding mucosa but in other portions of the circumference there was a gradual aloping This description does not

fit with any picture of carcinoma neither does it correspond with the known pictures of lymphosarcoma It certainly should not have been interpreted as polyposis. We believe that the appearance of the antrum alone would have permitted the diagnosis of a sarcoma

In Case 2 the correct diagnosis of a tumor was made. It was then stated that cinoma is most likely however a benign tumor especially myoma may be present. The latter tumor was considered because of the smoothness and roundness of the tumor seen. The consideration of carcinoma and of myoma came pretty close to the truth and one cannot consider this diagnosis as entirely wrong The gross specimen showed bridging folds at the lower pole of the protrusion but these folds the observation of which should have established the diagnosis of a submucosal tumor were not seen at gastroscopy. It seems that these folds usually are numerous and present at all sides of a benign submucosal tumor but they are only occasionally seen if the submucosal tumor starts to grow expan sively and infiltratively

Only one such fold was noticed in Case 3 (Fig. 12) Its presence should have forced the observer into the correct diagnosis in spite of his unwillingness to assume another case of ecomyosarcoma. We quote here the decisive sentence of the protocol in order to show how reliable such apparently minor gastroscopic signs are toward the upper edge of the wall several mucosal folds converged one of them running up to the wall in a manner usually seen only in submucosal tumors.

In Case 4 the gastroscopic appearance was that of a carcinoma, and retrospective analysis reveals no sign which could have been inter preted as characteristic for a submucosal tumor

Thus we come to the conclusion that in 3 cases (1 2 and 4) the x ray diagnosis would not have been impossible and that in 3 cases (1 2 and 3) the correct gastroscopic diagnosis should have been made The preoperative diagnosis of lecomyosarcoma of the stomach is in the realm of possibility

Relationship between leiomyosarcoma and per nicious anemia. The frequency of benign adenomas in pernicious anemia is well known (Brown Schindler, 17) More and more the opinion gains ground that carcinoma develops secondarily to pernicious anemia more frequently than should be expected. However no such relationship is known between permi cious anemia and tumors of muscular tissue

In our material twice a pernicious anemia was diagnosed (Cases 1 and 2) This diagnosis was obviously wrong in Case 1 in which free hydrochloric acid was found at the histamine test In Case 3 the clinical picture was that of permicious anemia. The hemoglobin was 6 3 grams with a red count of only 900 000 The color index was 20. The white count was 3 000 There was 0 5 per cent of reticulocytes After liver therapy there was a typical response the reticulocyte count went up to 22 per cent. There was no free hydrochloric acid in the gastric contents at histamine test -The gastric mucosa did not show any sign of inflammation at gastroscopy but by microscopic examination mild but definite atrophic gastritis was found Schindler and Serby (20) described cases of untreated permicious anemia in which only partial atrophic gastritis was seen and one case in which no atrophy at all was seen but only superficial gastritis. The conclusion must be drawn that pernicious anemia is not necessarily accompanied by se vere or complete atrophy but that mild in flammation may be present as well -In this Case 3 everything speaks in favor of permicious anemia being present

Relationship between pernicious anemia and the gastric muscularis propria is known to exist. Koch described 3 cases of hypertrophy of the pylone musculature in permicious anemia Mayeda described enormous thicken ing of the muscularis propria increasing from the cardia to the pylorus in a case of perni cious anemia. It is true that in cases of malig nant tumor of the stomach macrocytic anemia has been observed but in all such cases the question remains open whether or not the macrocytic anemia preceded the tumor forma tion Although we cannot exclude the possibility of a macrocytic anemia caused by the leiomyosarcoma of our Case 3 we want to suggest the possibility of the reverse sequence namely pernicious anemia leading to forma tion of leiomy osarcoma

tumors.

Treatment The gross and microscopic observation in Case 1 shows that x ray treat ment of gastric leiomy osarcoma is ineffective

Surgery however proved to be eminently satisfactory In one case (Case 3) extensive gastric resection was carried out. In the 1 other cases total gastrectomy with splenec tomy and pancreatectomy was performed Only one patient died postoperatively (Case and this death was not due to abdominal catastrophe but to massive pulmonary atelec tasis. Three patients survived the enormous procedure and seemed to be cured perma nently It is remarkable that these operations were performed by four different surgeons in three different institutions Certainly surgery was in extraordinarily competent hands in all cases and there is no doubt that great progress has been made with the technique of such procedures as total gastrectomy and partial gastrectomy let one may consider the possibilities that the vitality of patients with leiomyosarcoma may not be so affected as it is usually in carcinoma. In leiomyosarcoma the surgeon cannot be easily too courageous. The excellent results obtained in our series justify the attempt to remove even the largest

#### STRUMARY

- r Four cases of leiomyosarcoma have been described.
- 2 The possibilities of the roentgenologic and gastroscopic diagnosis of this tumor have

been discussed its possible relationship to pernicious anemia has been considered and the excellent results of surgical treatment have been described

#### REFERENCES

BOCKUS, H. L. Gestro-Enterology Philadelphia

W. B. Saunders Co., 043.

BORRMANN, R. Geschwießte d. Magen. In Heike
Lubarsch. Handb d spez. Path 4th ed., Vol. 1

p. 814 Berlin Springer ond.
3. Brown, M. R. N. England J. M., 934, 1 475.
4. BUNCHER, F. and CARTEIL, S. T. Am. J. Roenty.

1943 40 450. 5 CABO7 (Case 5082) N England J M., 939,

120 351 6. CAMERON A. L., and BRITELICH, P. J. Surgery 447 9 916.

7 CHAPTER, L. West. J Surg. 1938, 46 513.
8. CROWN B B Affections of the Stomach. Philadelphia W B Saunders Co., 1977.
9. HOSSILY G and BERROYER, R. A. Ann. Surg. 1949.

o. Kocst. E. Frankf. Zachr Path., to v 16270 LEMON R. and BRODERS, A. Surg. Gyn. Obst., 044

12 MAYEM, T Schweiz med Wacht of 51 600, 3. Rezentaw S. F. J. Am. M. Ass. 936, 97 426, 14. REZENTS, J. H. Proc. Mayo Cilia, 939, 5 94, 5 Schmenzer, R. D. Klin, Wacht, 923, 13046.

16. Idem. Gestroscopy Chicago University of Chicago

Press, 1937
Jidem Am J Dagest. Dis., 941, 9.149.
S. Schunders, R., and Larrathez, P Sorp. Oys. Obst.

1942 75 547 o SCHEROLER, E., SANDWEISE, D. S., and MORT, L.L.

Am J Digest. Dis 1942, 0:289 SCHOULER R., and SERRY A. Arch. Int. M. 1949. 63 334

SCHROPDER, G and SCHUTTERMERG, V Arch. Surg 043, 47.5

TEMPLITON FREDERIC E. X-ray Crambation of the Stomach Chicago University of Chicago Press,

## COMPOSITE FREE GRAFTS OF SKIN AND CARTILAGE FROM THE EAR

JAMES BARRETT BROWN M D F A C S Colonel M C A U.S St Louis, Missouri and BRADFORD CANNON M D Lieutenant Colonel M C. A.U.S., Boston, Massachusetts

REE grafts consisting of two surfaces of skin with cartilage between can be considered for the replacement of tissue lost from areas such as the nostril bor der and tip and columella. These defects can be corrected in one procedure with the best resulting appearance of any method used

This work has been done t Valley Forge General Hospital in saucistion with Major Carl E. Lischer Major Parke Scar borogh, Captain Bowdoin Davis, Captain Andrew Moore, and Captain Joseph Murray there is minimal deformity of the donor site and the use of bulk flaps is avoided. The ear can be repaired with a local flap or by burying the open car under a direct scalp flap from behind and freeing it and grafting the defect 2 to 3 weeks later.

The procedure is useful for tissue losses from burns gunshot and shell fragment wounds as well as other traumatic or oper ative losses It is necessary that there be a

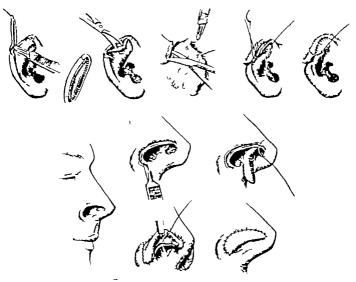


Fig. 1. Illustrating the steps in repair of nostril border with composite free grafts of skin and cartilage. Drawing by T/5 David G. Parsons.

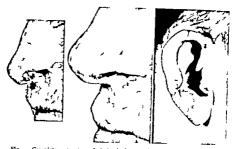


Fig. Complete restoration of all 1 single operation it in composite free graft of skin and cartilings. Ear border already deformed by being abort through, used for all before repair of ea with direct early flags. Flag detached 3 weeks later



Fig. 3. Restoration of columella, tip, and als in single operation by use of composit. Free graft of skin and curtakege. Notching of upper and lower has been corrected.

satisfactory minute blood supply in the recipient area and the defect has to be opened widely and deeply over a sufficient area. This procedure creates a larger defect to be filled than the original defect

The size of replacement tissue of course is limited. So far the whole columella tip and one border of the nose have been put in at one operation, also nostral borders on two ides. A great bulk of tessue cannot be transplanted as a free graft the maximum at present has been about it centimeter in width, leight has not been important. The amount of available ear structure is also a determining factor the part of the border containing cartilage being used. (In some instances, the errorder is already deformed and has to be repaired anyway so that no extra operation is



Fig. 4. Large replacement of nostril differt by use of free composite graft of skin and cartilage in a single operation. Minimal ear deformity with scalp flap restoration.

necessary The desired graft is taken off for the nostril when the ear is repaired. In severe hums when both ears are largely destroyed the source is lost.) At operation the defect is prepared so that the area has a good minute blood supply. The graft is cut to pattern from a suitable portion of the ear in a region where cartilage presents just under the skin Care is taken not to separate skin from cartilage. The crus of the helix can be utilized.

The graft is sewed accurately in place with fine sutures along all edges with one or two deep ones at the start.

The nostril is packed and a firm pressure dressing applied. The graft may become blue and discolored and even blister and careful attention and protection are required in its management.

small areas of flat cartilage with overlying skin can also probably be done but enough observations have not been made to report this variation. This graft is taken from behind the ear and the skin is cut larger than the cartilage so that it can spread out and pick up a blood supply. These grafts necessarily have to be small, and the skin over the cartilage probably survives because of a lateral blood supply coming in through the edges rather than by a supply through the cartilage.

#### SIDIMARA

Sections of the border of the ear containing two surfaces of skin with cartilage in between have been successfully transplanted as free grafts and defects of the nostril border tip and columella have been repaired satisfactorily in a single operation

# SUBCUTANEOUS HEPARIN IN THE PITKIN MENSTRUUM FOR THE TREATMENT OF EXPERIMENTAL HUMAN **FROSIBITI**

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HILE numerous reports have been published concerning the morphologic changes that occur in frostbite the literature concerning the functional pathology is scarce Green's excellent studies of the pathologic changes occurring in experimental frostbite pointed the way for detailed investigation of the physiologic changes occurring in this lesion. The use of the fluorescein test (1 4) was a medium through which the sequence of events could be observed in tissues exposed to severe cold. In this test small amounts of fluorescein are injected intravenously and the migration of the dye through the blood stream and the interstitial spaces is observed under long wave ultraviolet light

As a result of studies in artificially frost bitten animals (5) it was established that for periods from 10 to 120 minutes following exposure to severe cold no fluorescem appears in the exposed areas thus indicating a severe spasm of the arterioles. This condition is followed by a second stage during which all blood vessels reopen and fluorescein can be seen throughout the exposed areas. The diffusion of the dye into the surrounding tissues in this stage is many times greater than it is in the nonexposed skin due to increased capil lary permeability the picture of intense by perfluorescence in the previously frozen areas is thus produced. This period is also charac terized by marked swelling of the exposed region Fight to 14 hours after exposure a repeat fluorescein injection shows that now the exposed spots are nonfluorescent indicat

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Alded by grant of foods from tricois of the Jewah Hospital and the John and Many R. Markle Foundation and the Cosmolous of Mexicony, and Theraportons of the American Medical Computation of the American Medical

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ing a pregangrenous state. This nonfloorescence increases in the next hours until finally the entire locus is nonfluorescent and be comes gangrenous. Biopsy specimens taken at this time show that in agreement with the findings of Green and Kreyberg there is a clumping of red cells in the dilated smaller vessels. This clumping is probably due to loss of plasma through the highly permeable vacular wall. The red cells are stranded and all the blood vessels, thus forming a sludge. They do not however represent true thrombi. The simple injection of saline enables one to wash out these erythrocytes as individual cells. Only after at least 72 hours does organization of these cells occur. This organization ultimately leads to infarctive gangrene. It is during the prethrombotic sludge phase that the therapeutic attack must be initiated to avoid thrombosis and ultimate infarctive gangrene as promptly as possible following ex posure and ideally before thawing is complete.

Animal experimentation substantiated the fact that the timely use of hepann prevented gangrene whereas control untreated animals uniformly developed gangrene commensurate with the degree of frostbite

It was now essential to apply these experiences to the human The practical demonstration of the therapeutic value of heparimzation in the prevention of gangrene was made possible by the study of artificial frostbite in human volunteers. These volunteers were recruited from patients who were being treated for subacute bacterial endocarditis by the combination of penicilin and hepana (6)

This investigation in human volunteers had a twofold purpose first to corroborate animal experiments and second to evolve a simple practical method for the heparin treatment of frostbite The subcutaneous heparin prepara-

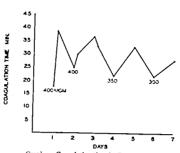
TARIFI HEPARIN-PITKIN MENSTRUUM FORMULAE

With vasoconstrictors	LP-o mana.	LP s	LP	LP OLTE
Crystalline sodoum salt of heps	200	200	0	
Frenephrine by drockloride	.0		-	_
Ephedrine sulf te	5	- 5	,	-
Chlorbutanol	5	5	-	- '
Europi diby drochloride	٥	<u>'</u>		
Pitkin menstroom q ad	oc.c.	oc	α.	
Nithout resocienstrictors	LP 4	LP	LP region	LP m m
Crystallior sodium salt of separa	00	200	∞0	
Chlerbutanol	5	5 .		-
Europia daby drochloride	٥			
Palis menstroom q ad.	OC C.	oc	OC.	

tion in the Pitkin menstruum (7 9) seemi i uniquely applicable in this connection mtravenous administration of the aque u commercial preparation of heparin would in volve a more elaborate set up than the simple intramuscular or subcutaneous injection of the drug in Pitkin s menstruum This method of depositing heparin achieves a consistent re tarded, and equal release of the anticoagulant The Pitkin menstruum which was designed to regulate the rate of release of water soluble drugs is composed of gelatine dextrose gla cal acetic acid and water in definite propor

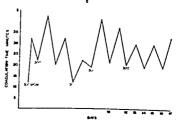
Various formulae (Table I) have been de veloped containing variable amounts of hepa rin in the Pitkin menstruum with or without vasoconstrictors The vasoconstrictors have an additive prolonging effect. By combining the injection of various ampuls one is able to employ greater or lesser amounts of hepa un with or without vasoconstrictors.

The method of administration is as follows the tontents of the ampuls are liquefied in hot tap water drawn up through a 2 to 2 inch 18 gauge bredle into a 5 or 10 cubic centimeter syringe and injected subcutaneously preferably into the anterior or lateral aspect of the thigh. The pain an I the di comfort is variable and transitors The injections are given, as a rule every day or every other day and the average dose is 300 milligrams of heparin Occa ionally, 400 milligrams is required. The cor feet dosage is estimated by following the coagulo-

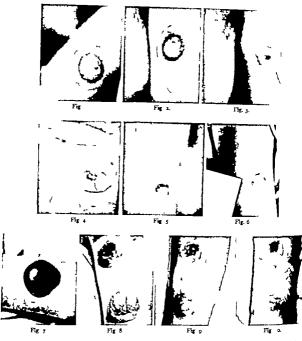


Graph r Congulation time in Case 2 S.Z.

grary as determined by the Lee White modification f H well's method By this method the average ntrol congulogram is 9 to 15 minutes Prolonga ti n t 30 minutes to an hour is considered a satisto the response. The response to the preparation i ir lictable in most instances as judged by obser vati n of its clinical deportment in considerably over 1000 depositions administered in well over 200 pa tients suffering from subacute bacterial endocarditis or thromboembolic disease. The anticoagulant of fect may be markedly depressed by the application of ice hags to the site of the deposit or may be ac celerated by the local application of heat. Because of the urgency for obtaining prompt adequate anticoagulant effects in the treatment of frostbite a larger initial dosage such as 400 milligrams was em pl ved at times in conjunction with local heat. In this manner anticoagulant activity was observed within an hour



Craph 2 Coagulation time in Case 3 L.C.



S.F male. Two days after exposure to crucible filled with dry ice applied for min test the upper arm. Fig. a. The same patient 4 days after the dry los ex DOSUTE.

Fig 3. The same patient 7 days after the dry ice ex

Fig. 4 S.Z., male. Two days after exposure to crucible led th dry ice applied for minutes to the upper arm. filled Heparimention started immediately after th exposure. Fig. 5 The same patient 4 days after the exposure and after the start of heparin treatment.

Fig. 6. Same patient 7 days after the exposure and days after termination of the heparin treatment.

Fig. 7 E.C., female. Two days after exposure to crucible filled with dry ice polici for 30 minutes to the

oper arm. Fig. 8. Same patient 8 days subsequent to the initial exposure and days following a second exposure under the same conditions but which was followed incaediately by

heparinization.

Fig 9. Same patient so days after the first exposure and 14 days after the second exposure which as followed by

beparinization. Fig o. Same patient sy days after the first exposure and a days after the second exposure followed by separate sation.

GE ET AL he practical demonstration of the thera tic value of the method was made possible our study of artificial frostbite in eight man volunteers. In one group the frostbite is accomplished by means of a porcelain ucible filled with dry ice and applied with it pressure, to the skin of the lateral aspect the upper arm for 10 minutes. An area bout 2 centimeters in diameter came in con act with the skin By this method a temper sture of approximately minus 22 degrees C was achieved Heparinization was started im mediately following the exposure. One volun teer served as a control The other group was subjected to local refrigeration in the same manner but for two exposures of 30 minutes each. The initial or control exposure was per mitted to develop for 6 days before the second frostbite was induced immediately following which, treatment with the subcutaneous hepa nn in the Pitkin menstruum was initiated The 30 minute exposure with dry ice results in temperatures considerably below minus 22 derees C and is comparable as to the degree of xposure, to the frostbite suffered by aviators n high altitude flying such as nose gunners after demolition of the plexiglass protection or gunners attempting to unjam guns without

The metamorphosis of the untreated lesions glove protection and the repair following heparin therapy are shown in the following illustrated cases.

CARE I SF male aged 33 years control case The patient was suspected of having subscute bac tenal endocarditis although no organisms had been recovered from the blood stream on repeated trial. He had been accepted for treatment with penicilin and heparin, which however had not as yet been started. A 10 minute application of dry ice produced a frosted depressed area 25 centimeters in diameter with surrounding raised crythematous zone frozen stiff About a hours later the area of central depression was pink and elevated with a small zone of surrounding crythems. The following day the peripheral crythems about the frozen area had disappeared. The lesion was gray brown with superficial vesiculation and had become completely anesthetic (Fig. 1) By the fourth day the central gangrenous ares with surrounding hyperemic zone had progressed further (Fig. 2) The lesion on the 17th day appeared as a healing tesion with the exception of a small central necrotic, ulcerated crusted area about 36 of an inch in diameter (Fig 3)

CASE 2 S.Z. male aged 35 years suffering from subacute bacterial endocarditis due to a gram negative anaerobic coccus of the Vellionella group He had several courses of penicillin heparin therapy and was at the time in a post therapeutic observa tional period. He was given a 10 minute exposure similar to that given SF following which he was mmediately given 400 milligrams of heparin subcutaneously without vasoconstrictors (2 LP ir Table I) The congulation time rose promptly to almost 40 minutes from a control of 18 minutes (Graph 1) The following day another 400 milh grams was given despite an adequate coagulogram of about 25 minutes in order to bridge the initial critical period with optimum anticoagulant responses He was given another deposit of 350 milh spring (LP 11 plus LP 13) 48 hours later and 48 hours after that a final 300 milligrams (2 LP 13) The graph indicates consistent and satisfactory heparinization. After 24 hours the initial depressed area was raised gray brown in color with a super imposed vesicle about I centimeter in diameter (Fig. 4) Four days after exposure there was marked hyperemia of the exposed area (Fig. 5) lesion resolved without necrosis as shown by a com parable photograph taken on the 17th day following the exposure where almost complete healing is indi cated (Fig 6-see control Fig 3)

CASE 3 E C female aged 21 years suffering from aubacute bacterial endocarditis due to Streptococcus viridans She was given a control frostbite by ex posure to dry ice for 30 minutes. Two days after this exposure an enormous blister involving the en tire lesion was at its height (Fig 7) Six days after the control frostbite was produced, a similar 30 minute exposure was effected below the control area immediately following which 300 milligrams of hepa rn in the Pitkin menstrum without vasoconstric tors (a LP 13) was deposited subcutaneously in the lateral aspect of the thigh. The coagulation time rose from a control of 12 minutes to 33 minutes (Graph 2) and dropped to 22 minutes the following day at which time an additional 300 milligrams (2 LP 13) was given with a prompt rise to 42 min utes Thereafter, 300 milligrams (2 LP 13) was de posited every other day Heparinization was con sistent and adequate with the exception of the 6th day However it is more than likely that the ef fective therapeusis was accomplished within the span of the first 6 days

Eight days after the control exposure the un treated lesion appeared as a large ruptured bulla with an indurated base Necrosis was also evident. Two days after exposure, the heparnized frostbite lesion was large, bullons and without induration (Fig. 8) Necrosis of the control untreated area was still fairly extensive 20 days after exposure but the heparmized lesion 14 days after exposure showed merely hyperemia and dilatation of the blood ves merely hyperemia and unite (Fig. 9) The complete sels without loss of tissue (Fig. 9) effectively por necross of the untreated area is effectively por necross of the untreated area. trayed 27 days after the control exposure

contrasts with the almost complete healing of the treated heparinized lesion at days after exposure (Fig 10)

#### BUMMARY

- The functional pathology of frostbite is discussed and the early heparinization of patients with such lesions is suggested.
- 2 Heparin in Pitkin's menstruum deposi ted subcutaneously or intramuscularly is a simple and satisfactory method of achieving effective anticoagulant responses
- 3 Eight volunteers were exposed to small areas of frostbite by the use of dry ice. None of them developed any tissue loss when ef

fectively treated with subcutaneous became while the control lesions showed central ne crosis.

### REFERENCES

- r Green R. J. Path. Bact., Lond., 1943, 55:250-367 s. Kreyneso, L., and Romes, L. Acts. path. pilcob. scand., 1932, 1 1162 3. LANGE, K., and Boyn, L. J.Med. Cha. N America, 1942,
- 26 334 932 1 101 M., 1044, 74 175 184 5 16es Syn, Gyn, Obst., 1045, 50 346-330. 6 Lower, L. Bull. N York Acad. M., 1915, 21 29-26. 7 Lower, L., and Rossonatar P. An. J. M. Sc., 444,
- - 7 DOWN, L. ROSCOSLATT P GREENT, NJ and RIM-SELZ, J J Am. M Am 1944, 24744-149 9. LORWS, L. ROSCOSLATT P and LEDERS M. Pre-
  - Soc. Exp. Blol., 1042, to CL.

# MILITARY SURGERY—UNITED STATES ARMY— EUROPEAN THEATER OF OPERATIONS, 1944-1945

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MISSION OF UNITED STATES ARMY MEDICAL DEPARTMENT

THE Medical Department of the United States Army has a threefold mission-first, evacuation of the wounded, both from the battlefield where their presence jeopardizes morale and from the Army hospitals, where their care infringes upon the mobility and supply of combat forces. The second function is that of professional medical care. For this purpose an organization must be set up that brings the battle casualty and the medical officer together and provides the medical officer with those facilities necessary for such care. The third function is that of the restoration of injured men to combat. The number and per centage of wounded who can thus be returned to combat may in a war of attrition dictate success or failure. The medical departments of other armies may have other objectivescertainly, our mability to capture wounded Japanese in any number suggests that the medical department of the Japanese Army has a different mission

ORGANIZATION OF ARMY MEDICAL DEPART MENT EUROPEAN THEATER OF OPERATION

To accomplish this threefold mission there must be a carefully integrated organization and some understanding of this is desirable if one is to appreciate the results which it has achieved. A primary consideration is the complete interdependence of administration and professional care, on which depends its effectiveness. The civilian doctor is prepared to expend every ounce of energy and all of his time on a single patient, knowing that others can be found to care for additional injured or sick people who might present themselves at the same time. This policy when one is confronted with thousands and

Hunterian Lecture Royal College of Surgeons of England, June 14, 1945 not individuals must be forgotten in the greater good for the larger number This change of outlook from the individual to the mass is the chief difficulty confronting the civilian doctor when he enters military ser vice. Moreover if the three functions of the Medical Department are to be fulfilledevacuation medical and surgical care and restoration to combat fighting-attention must be focused more and more on those who can be returned to duty. By so doing eventually a greater good for humanity will be achieved for if large numbers of men can be restored to the fighting forces, war will end sooner and thus humanity suffer less. This need not result in neglect of the severely damaged soldiers.

The organization for medical care in the United States Army begins at the battle front and extends through to hospitals in our communications zone in a theater of war, from which the soldier may be returned to the combat forces or through to hospitals for rehabilitation in the United States of America Charts 1 and 2 present graphically the course of the casualty from front to rear The care of the wounded soldier begins on the battlefield there Company Aid men render first aid care. They control hemorrhage dress the wounds initiate sulfonamide chemotherapy control pain with morphine solunt fractures and evacuate the wounded to the Battalion Aid Stations in the forward part of the combat division. The devotion and training of the medical soldier-of whom more than 2 000 have been killed in action in this theater-has been a major factor in the good results achieved by the medical department in this theater At the Battalion Aid Post where there is a medical officer in attendance dressings are checked, splints readjusted, plasma is available if required tetanus toxoid should be given, and the field medical record if it has not been initiated by the Company Aid

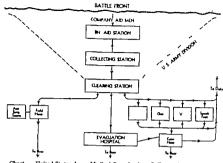


Chart United States Army Medical Organization. I Forward area (Army)

man is properly filled out. Evacuation from the Battalion Aid Post may be by hand litter or by jeeps with improvised litter racks, or even by ambulances. In the standard United States Army organization such transport would be to a station at about the midpoint of the Division known as a Collecting Station At these points the dressings should be in spected and reinforced if necessary but not taken down since each dressing adds further contamination. Here solints can be readjusted warm food in the way of hot drinks is available, the field medical record is further completed and a check carried out as to the tetanus toxold injection From such collect ing points, ambulances should carry the patients to the rearmost point in the Division where the Clearing Station is located. Here begins sorting or triage, a function which continues throughout all hospital installations.

The Cleaning Station has a limited number of beds, and lightly injured and nonseriously ill soldiers may be held there and from this point returned to duty without leaving the limits of the Division. It has been well established that the further down the line a soldier goes the more difficult it is to return him to the combat forces. Because of this, and in order to increase the holding capacity in the divisional area, small tented units have been

made available for special functions, such as the care of venereal disease and neuronsy chiatric cases and, during the recent winter the care of those with mild trench foot. The Clearing Station having determined that such cases are simple or nonserious, and may remain at this level, makes such discoution. Its next sorting is to divide the battle casualties and more seriously ill into two groups first, those who are seriously damaged and cannot travel far without immediate surgical assistance and, second, those who may travel further The first group go to the platoon of a Field hospital. The Field hospital is a tented unit of 400 beds, capable of division into three platoons with 100 beds in each. It was not originally intended for this function, but was the unit best suited for its present use and has proved highly satisfactory. A Field hospital platoon can hold between 80 and 1∞ casualties. It is set up in juxtaposition to the Clearing Station so that carrying from one to the other is by hand litter. The categories of those cared for in the Field hospital comprise those injured in the abdomen, the chert, those with serious damage to the face and neck, whose respiration is interfered with and who may need immediate tracheotomy and finally any other casualties whose condition is such that evacuation further would jeopar

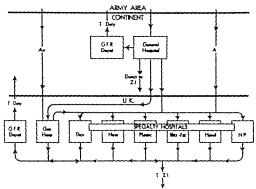


Chart s United States Army Medical Organization. II Communications Zone (Continent and United Kingdom.)

due their opportunity to survive. Such may be those with multiple serious fractures. All other battle casualties by pass the Field hospital and go further to the rear to an Evacuation hospital. This sorting at the Cleaning Station is a function of greatest importance and must be by experienced officers.

At the Clearing Station whole blood is available, and those who can travel following a transfusion of blood and/or plasma receive such treatment there Also at this level treat ment with penicillin is begun and from this point to the rear penicilin is available for regular parenteral injection. In the early part of the recent campaign sulfonamide therapy begun on the battlefield by the Company Aid man was continued to the Evacuation hospital, and a majority of individuals for a few months received simultaneous treatment with the sulfonamides and penicillin As time passed and penicillin was in liberal supply the continued medication with sulfonamides gradually diminished until now it is practically reserved-other than the initial dose on the battlefield-for areas where penicillin is not available.

Each Army controls two special medical units—a Convalescent hospital and an Auxili ary Surgical Group The Convalescent hospital arguments.

pital has 3 000 beds and usually has a policy permitting the holding there of soldiers who may be returned to duty within 10 or 14 days If sick and wounded require a longer period they would not stop at the Convalescent hospital but pass to hospitals in the Communications Lone The Auxiliary Surgical Group is an assemblage of 61 surgical teams the majority of which are headed by general surgeons though there are attached special teams in orthopedic surgery neurosurgery thoracic surgery maxillofacial surgery and the treatment of shock. These surpreal teams do the professional work in the Field hospitals, which are not staffed with expert sur geons and also bolster up the Evacuation hospitals where there may be an insufficient number of surgeons for the load imposed. The professional abilities of these team surgeons have played a major role in the diminution of mortality rates. The rapidity with which younger surgeons improved their technique and acquired judgment is a great tribute to their fundamental training in the medical schools of the United States of America. The existence of such an organization permits the movement of surgical teams at any time to an overloaded hospital and effects a saving in highly trained professional personnel.

The organization for care in the Communi cations Zone (Chart 2) is built around the professional work in General hospitals These are ordinarily 1,000 bed institutions, capable of expanding to 1 500 beds but may be larger Such General hospitals are frequently grouped together in what are called Hospital Centers which greatly increases the flexibility of care and evacuation and decreases the number of highly trained personnel required. Thus, if ten hospitals can be grouped together a service can be established in selected hospitals for the care of special types of injury. These are generally divided into centers for thoracic surgery neurosurgery maxillofacial and plastic surgery and for the care of those injured in the hand. Because of the local situation in this theater we provided ourselves with hospitals of this type both on the Continent and in the United kingdom Early in the campaign all of the centers for such specialist care were in the United Kingdom and in these special hospitals the greater percentage of such care was accomplished. This grouping of casualties under highly trained experts led not only to splendid care of the individual case but provided sufficient material to permit critical evaluation of methods of therapy which led to a steady improvement in our technical procedures. Finally from hospitals in the United Kingdom or on the Continent evacuation both by air and sea had to be provided for the patients who could not be returned to duty and who should be returned to the United States of America.

This entire system of hospitalization is flex ible, for it must vary with the military situa tion, since the tactical action and the numbers of casualties resulting from such activity die tate the theater policy for evacuation. Almost to the end of the campaign this theater functioned under a theater policy of 120 days, which meant that any sick or wounded soldler who could be returned to duty within 120 days could be held in the hospitals of the European Theater of Operations. Because of the diffi culty of evacuating soldiers to and from the United Kingdom an additional policy was established relating to which cases should be hospitalized in the United Lingdom and which should be held in Continental hospitals.

As a rule long term cases went to the United Kingdom, and those who could be shortly returned to duty remained in Continental hospitals but when casualties were reaching be tween 40 000 and 50 000 per month, and when the Continental hospitals could not hold all those who would be returnable to duty in 60 days, or even in 30 days modification of the policy came into being and many who were returnable to duty in 60 days or even less had to be evacuated to the United Kingdom and then brought back to the Continent when ready for duty Similarly it was inevitable that in the rush of work (60 000 patients were moved by air in May) individual casualtes who perhaps could never have been returnable to duty even in 120 days, were mistakenly routed and had to be held in our Continental units but these incidences must be looked upon as unusual.

All this emphasizes that only the perfect interdigitation of administrative and professional personnel can lead to a happy solution when thousands of wounded men are handled Professional personnel must be informed where the load is to be borne how long casualties can remain in one hospital, and what methods of evacuation are to be used # proper care is to be given. And personalities must be forgotten. In spite of difficulties, the professional group always attempted to carry out the policies set by the chief surgeon, both those which placed a time limit on professional care and that which demanded of us that the American soldier be given the best care possble under the conditions imposed by the militory atuation. Administration must set evac uation and hospitalization policies, but these policies and the burden they impose are borne by others. Good results will accrue only when both are completely informed of the labor and responsibility of the other Directives are no substitute for good briefing whether the goal be tactical or medical

Sorting at the Clearing Station has already been dealt with. Further sorting is carried out in the Field hospital. Here with each admission an appraisal of the patients condition will dictate what kind of resuscitation is necessary whether the presence of a touniquet demands immediate priority for the oper

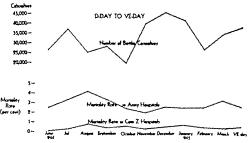


Chart 3. Battle casualties, Medical Department, European Theater of Operations, excluding K.I.A. Total battle casualties, 372,550 mortality rate, 3.9 per cent.

ating room or whether the missile's course and lodgment requires an x ray examination before the surgical ordeal.

Again, after the surgical intervention fur ther evaluation and sorting distinguishes between those who can stay and those able to be evacuated. The same kind of sorting evalua tion, and triage must go on in every hospital. Let us consider the importance of proper sort ing at the first General hospital the casualty enters after leaving Army installations. Here a dual function confronts the hospital-the wounded who have slipped through the Army hospitals without primary care must be given that care and those who have received pri mary care and those now given it in this hospital must be routed after sorting according to the evacuation policy at that time Again consider the less busy General hospital in the rearmost area. Casualties may reach this hospital on the third or fifth day. The question immediately arises—which wounds can be sutured and which must be left open? All military surgeons must recognize that this constant evaluation and sorting into special categories for evacuation or professional care u a major function for the medical officer

# STATISTICAL DATA ON MORTALITY RATES AND DISPOSITION

Certain statistical data are presented at this point not to emphasize the immensity of the task now just completed but to demon strate that the results achieved in this war differ sufficiently from those in World War I to demand an estimation of the factors that have brought about these improvements Also lessons may be drawn that will benefit our casualties resulting from the growing con filet in the Pacific.

Chart 3 summarizes the United States Armies European Theater of Operations total wounded in action casualties from D-day through VE-day and presents the overall mortality rate of these casualties in medical installations. This mortality rate of 39 per cent in 372 556 battle casualties is approximately one half of the rate in the first world war. Of the 39 per cent mortality about 0 5 per cent die within the medical elements of the combat division (Battalion Aid Post, Collection Station or Clearing Station) 27 per cent die in Army hospitals (Evacuation and Field hospitals) and less than 1 per cent in General and Station hospitals in the rear area.

The next three charts present comparative statistics for anatomical woundings. Chart 4 compares the regional distribution of the wounds in the casualties reaching medical units alive in the United States Civil War World War I and World War II The in creased percentage of wounds of the thorax and abdomen in this war as compared to World War I represents in part a higher survival rate possibly through better care on the battlefield and better evacuation Some of

directly contributing to the improvement of morbidity and mortality statistics, is the resuscitation of the wounded man. This transcends in importance any single method of therapy such as our ability to procure and deliver blood and plasma to casualties, for it betokens that the American surgeon has at last appreciated the importance of the complete evaluation of his patients before therapy He has learned to care for the whole of man and not for any fragment or any particular wound This, in turn has led to proper resuscitation and the better care of shock. Accretions to our knowledge concerning shock have come in steadily as experience has been ac quired Dependable studies of blood volume made in forward hospitals indicate that sol diers seriously damaged have averaged a loss of at least one-third of their total blood vol ume, and investigators have tried to set simple standards for recognizing this deficiency Majors Emerson and Ebert have stated that a blood pressure below 8x systolic usually betokens a loss of over one-third of the total blood volume. Professor McMichael of the British Post Graduate Medical School has stated that in the male thigh an increase in diameter of some 2 centimeters which, to the cursory glance would not seem great, may mean that 1500 cubic centimeters of blood are outside of the capillary bed and actually beyond the vascular tree

This is a matter of great importance Sur geons are apt to think that only when there is visible blood loss is the condition of the patient jeopardized but it can be seen that 3 000 cubic centimeters of blood may be lost from the circulation when there are wounds in both thighs, without more than a few drops leaving the body. It is this overall appreciation of diminution in the amount of circulat ing blood and this overall desire to look at the whole man and not the wound alone that has led to our greatest advance in this war From May 22 1944 to May 31 1945 385 231 pints of blood have actually been used in medical installations in the European Theater of Operations. Of this, 104 712 pints were flown directly from the United States of Amer ica. This blood has been available as far for ward as the Clearing Stations in Combat Divi

sions. It has been used largely in the Field and Evacuation hospitals in the forward area at the time of primary surgical therapy and has been used in great quantities, up to 6 or 7 liters in a single individual in one day. This widespread use of blood through its easy availability has brought in its train inevitable reactions, as well as great benefit. The best figures available at this time show that about 4.8 per cent of transfusions are followed by some kind of reaction allergic reactions, 0.0 per cent pyrogenic reactions, 37 per cent hemolytic reactions, o r per cent. The re actions vary in different types of institutions. and vary as to whether the transfusion a given early or late. As a rule, primar, transfusions have brought little reaction. Later transfusions, given in General hospitals, have often found the patient sensitized by the earlier transfusions. Pyrogenic reactions have increased where hospitals insisted upon cleaning their own glassware and not using sets furnished to them already clean and sterile As time has gone on reactions have diminished probably because of better technique, better refrigeration of the blood and through our ability always to furnish giving sets properly set up and sterilized at some central point. A particularly valuable study of these reactions following transfusion has revealed that the transfusion of large amounts of group O blood (the universal donor) and even of pooled plasma may result in serious hemolytic disease The implication is strong that, whenever feasible strictly compatible blood of the same group as the patient should be used that where large amounts of group 0 blood must be used only blood of a low titer should be administered Such information as this, and other studies now in process, will doubtless have some influence on the future set up of blood banks in civilian life

Chart 9 depicts the use of the varying uncthetic agents in over 360 coo cases. It is of interest to see as would be expected that the inhalation anesthetics are largely used in the forward hospitals for nontransportable canulties, comprising almost 45 per cent of all anotheties in Field hospitals. This is because a high percentage of the wounded there are injured in the thorax and must have endotra

CHART 9 -ANESTHETICS ACCORDING TO METHOD USED JUNE 1944 THROUGH FEBRUARY 28 1945 EUROPEAN THEATER OF OPERATIONS

Hospitals	General %		HEATER OF OF	EKV110A	3	_
Inhalation	6	Station %	Evecuation %	77.11.00		
Field blocks			14	Field %	Total	Total 9
Miscellaneous regional	a6 4	13		44.7	\$1706	87
Colasi	1.0		6.5	La	868	<u> </u>
Sympathetic	۵		4-7			27 7
		113	6		43	.8
Intravenous only				46	3 15	3.5
Intravenous combined	36 3	20			49.90	<del></del>
TOTAL	7.5		44	20.	34901	
	totob 181 6		8	6.8		36 8
Endotrachee!		9329	24.8		5 09	4
1		1.1			\$61,000	
≃a⊥anesthesia A	nother comment			28.9	35	

gested by the increasing use of regional or local anesthesia. It would seem that regional anesthesia is not, per se the anesthetic of choice when a wound must be widely dé brided and much tissue excised Regional anesthetics tend to limit the surgeon They may thus result in inadequate debridement of the wound and unless there be other contra dictory evidence it would seem wiser to ren der the patient insensitive as a whole for com plete toilette of the wound. The high percent age of procedures carried out under intra venous (pentothal) anesthesia represents the usciulness and desirability of this method

The débridement of the wound is the most important surgical task. It is of major impor tance for the end result, both as to life and as to function If properly done it should obvi ate serious infection. It may preserve a limb from amputation and if blood supply is intact and major nerves undamaged will leave good function. In the first place the surgeon should always attempt to visualize the position of the patient at the time of the injury This has been difficult to teach. Thus, a wound over the heart does not necessarily mean that the solider is wounded in the heart for if the sol her was lying down the missile may have raveled a great distance under the akin and ave done almost no damage and emerge dose to the hip joint. Similarly if the arm is flexed when hit but operated upon in the ex tended position the tract of the missile cannot be properly debrided unless the arm is again placed in the flexed position as it was when the missile traveled across the bellies of the

muscles We have watched a young surgeon attempting to find a missile in the inner con dyle of a knee-a missile which entered when the knee was in the flexed position but the surgeon was operating upon his patient with the knee extended and thus failed for some time to locate the course of the missile and therefore unnecessarily damaged an important

Another matter which must concern all military surgeons is what can be spoken of as wound ballistics or the application of physics to wounds. As early as 1914 it was shown that there was a definite relationship between the extent and severity of a wound and the kinetic energy (se mass or size times velocity) of the missile producing the wound The criterion put forward originally was that 58 foot pounds of energy were required to produce a casualty However this original criterion was based on observations pertaining to bullets weighing an ounce or more During the present war in vestigations have been carried out on the wounding power of very small high velocity fragments and it has been proposed that a new casualty criterion be set up on the momentary cavity which these missiles produce in tissues or experimental media. Although surprise has often been expressed at the large cavitation produced in soft media when a amall missile passes through it it can be shown that this cavitation is to be expected and that the same physical principles apply to its for mation in soft and hard media ranging from soft gelatin to hard steel

When a missile passes through a medium that portion of the medium which hes just

ahead of the missile must move aside with a velocity somewhat less than, but comparable to that of the missile that has imparted some of its energy to the tissue. The extent of radial movement or cavitation of the tissue in the nath of the missile depends upon the strength of the restoring force of the medium. Thus, the restoring force of steel or the tendency of the elasticity of the steel medium to reverse its direction of movement is great and the distance it moves radially along the path of a missile is minimal doubtless in most cases. a small fraction of a millimeter. In contrast with steel, whose restoring force is approxi mately 100 000 times greater than 20 per cent gelatin (which is comparable in density to human skeletal muscle) in the latter a momentary cavitation is produced along the path of a missile passing through Associated with the cavitation produced by a missile passing through a medium at a high velocity there is considerable damage to the medium at considerable distance from the missile tract. In instances where the medium is hving tissue nerves vessels and even bones may be severed or broken when a high velocity missile passes in the proximity of but not necessarily through such a structure. An appreciation of these facts is essential to proper débridement of a wound and explains the necessity for wide débridement

Let us now consider the actual carrying out of the debridement of a wound. In the first place proper preparation of the skin over a wide area must be performed. Soap and water is satisfactory but any good detergent such as ether gasoline or zephyran may be used This may be followed by alcohol or if the surgeon is wedded to dyes, merthiolate Next, the incision must be in the long axis of the body and sufficiently long to expose well every recess of the wound. A minimum of skin should be removed partly because skin is essential to proper early closure of the wound but also because skin itself is not alone the site of widespread infection. Only a minimum of 2 or 3 millimeters at the contacted edge of the tract need be cut away Fascial planes below this should be widely opened and where there is tough fascia as in the thigh, it is better to cut this transversely as

well as longitudinally. When one is concerned with the next layer muscle, the major problem arises in the proper débridement of a wound. All devitalized and dead muscle should be excised Hesitation to do this often results in disaster Live muscle is determined by its ability to contract and by its color If the wound is filled with salt solution after hemostasis dead muscle loses its color more rapidly than living muscle and all fraved fragments can be more easily detected. Once the surreon is satisfied with the muscle excision which must in perforating wounds, involve both aspects of a limb he must carefully determine the condition of the nerves and blood vessels. These are the most important elements in an Blood vessels should never be extremity ligated when the opening can be closed by a suture and if ligation seems essential, some form of tube if available should be inserted. The idea is to permit some blood to enter the extremity for at least 3 or 4 days until the collaterals have been given time to dilate and take over normal blood flow. In our opinion, henarinization of casualties, when there is the possibility of internal concealed bemorrhage, or where there are multiple wounds, carries too high a risk of secondary hemorrhage, and should be condemned

Next one must be concerned with the nerves. If these are divided it seems wise to approximate them loosely with a single loop suture of metallic substance such as tanta lum in order that one may find the several nerve at the time the nerve suture should be carned out and to prevent their retraction to the deeper receases of the wound Suture of the nerve at this time in a contaminated are is not good therapy and in fact, it has been shown that the axis sheath is much more likely to accept and guide new processes into the sheath after an interval of 3 to 6 weeks.

Bony fragments, unless they are absolutely loose and unattached to the periosteum, should not be removed, for now that the dan ger of infection has been mitigated by the advent of the sulfonamides and penicilin we must leave every piece of viable bone in the wound in order that nature may reconstruct the damaged part herself. No bone graft can ever hope to equal natural healing. All soft

tissue wounds not leading to the cavities with in the skull, the thorax and the abdomen must be left open in spite of modern chemotherapy infection remains a major risk, which is vasity increased by primary closure of the wound.

Finally, the dressing As experience has accumulated it is obvious that much damage is done by packing wounds open. Ideally, in very deep wounds a small slip of rubber tissue should suffice for the escape of tusue juices or a single piece of vaselinized gauze might be left in such wounds. Next, the wound must be properly bandaged. The advent of adhe sive plaster has lost to the surgeon much of his art as a dresser, but the ideal dressing was well described by Sampson Gamgee almost 100 years ago, it should cover the wound com pletely and extend well beyond the wound to keep out further contamination The dressing should contain enough substance so that when the bandage is applied it will be elastic and give gentle compression and comfort to the part. In turn, if the part is elevated swelling is diminished circulation is improved and pain is minimized as the sensitive tactile end organs are no longer stimulated by pressure In the greater wounds it is wise to add further means of immobilization. This may be only a splint, or better a light plaster shell The value of this immobilization of recently dam aged tissue was perhaps overemphasized by the Spanish school, which felt that a limb should remain in plaster of paris until healing of the bone took place Such prolonged immobilization led to a neglect of proper alignment of bone, though it did possibly assist, in the days before the sulfonamides and penicillin in decreasing the spread of infection. Thus debridement of the wound is a major element in happy results. Chemotherapy has, indeed revolutionized modern military surgery and opened up immense possibilities in the earlier and more complete restoration of function But chemotherapy cannot effect sterilization of dead and devitalized tissues surgery alone can be useful in such curcumstances

#### THE SURGICAL SPECIALTIES

Great advances have come during this war in each specialty. There are differences of

opinion as to whether the specialist has a place in the forward zone but the answer de pends upon the definition of specialization. All surgeons whether they be in a narrow specialty or a large one should have first a broad general training in surgery. If this is the training of the specialist then he may be immensely valuable in the forward area.

Thoracic surgery has already laid down cer tain incontrovertible dicts for military sur gery First, conservatism in the forward area only sucking wounds of the chest and pressure pneumothoraces and the greater wounds must be dealt with forward the majority of thoracic wounds except for the great necessity of keeping the pleural space emptied of blood do better with a period of delay and the more elaborate procedures when they seem necessary carried out in specialized hospitals in the rear area. The advent of chemotherapy has resulted generally in a decrease of serious in fection in this field for work. A special word must be said for decortication of the lung a procedure which has proved satisfactory up to the third and even later than the tifth week following injury and also even when a very considerable amount of infection is present. The removal of a clotted hemothorax and decortication bears some relation to the removal of a subdural hematoma and indeed it may be that the increasing size of clotted hemotheraces bears a similar relation to the increased osmotic action of broken down hemoglobin as it does in intradural hematoma

The field for neurological surgery has made great advances. In our Army those operated upon in the forward area are largely those actively bleeding threatened with increasing intracranial pressure or with very large re tained missiles. It has been observed that less serious intracranial damage withstands trans port very well and that in patients properly treated with penicillin the advent of serious infection is no greater when such patients must wait 3 to 4 days before reaching a hospital for specialized care in the rear area. In the field of peripheral nerve surgery equally im portant advances have been made. Our sur geons have made every attempt to close wounds as early as possible, and in the large percentage with nerve damage have sutured

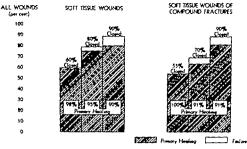


Chart 10. Increased "aslvage" with great proportion of secondary closures attempted.

procedure Such a closure should be spoken of as delayed. It is not a secondarily closed wound because it was never closed before. It is not delayed primary closure because there has been no primary closure. We have had a large experience in this field. All our hospitals are instructed to close wounds at any time after the third or fourth day. The optimum time is certainly before 10 days, when granu lation tissue and cicatrization have already begun to defeat any attempt to draw together the lips of the wound without a secondary cutting operation. It may be stated that around 75 per cent of all wounds are solidly bealed 2 weeks or less after the delayed closure and that at 3 weeks go per cent are solidly healed Variations in these percentages will occur with individual hospitals. The most difficult task in this field has been to persuade our surgeons to attempt to close all wounds. Some surgeons report statistics where 95 per cent of their wounds thus closed healed per primam but some of these surgeons do not attempt to close all wounds and the figures for the attempted closure of all wounds which represent the salvage for the Army are the only ones of importance Chart to reveals interesting data in this special field collected from several different hospitals. When o8 per cent of soft tissue wounds healed per pri main only 60 per cent of all wounds were closed when 90 per cent healed per primam

Based on operamitative data from various General Hospitals.

oo per cent of all wounds were closed. In the latter hospital, though the healing rate was not so high, the ultimate salvage for restor ation to duty was 20 per cent greater

In the closure of wounds of compound fractures it is again evident that attempts to close wounds should be more universal even if a lower percentage of wounds heal per primam the salvage for future duty is greatly increased when this is practiced.

#### REASONS FOR TAPROVED STATISTICS

It would be impossible at this time to evaluate and put in proper perspective the reasons why the mortality rates in the United States Army in World War II are one-half as great as those in World War I but there is every reason to believe that the following have each played a rôle

r Resuscitation The proper treatment of the patient in shock, chiefly by the use of plasma and blood.

a Better first aid by the Company Aid man on the battlefield.

Penicillin and the sulfonamides which have vastly reduced the horror of infection.

4 Improved methods of transport and evacuation which allow earlier meeting of surgeon and casualty and more comfortable travel.

g Good general physical condition of the soldier. This may be partly diet or it may relate to the physical training to which he has been subjected before battle.

# THE ORIGIN, FREQUENCY AND SIGNIFICANCE OF MICROSCOPIC CALCULI IN THE KIDNEY

LEO ANDERSON M D and JOHN R McDONALD M.D. Rochester Minnesota

LTHOUGH considerable interest has been focused on the pathology of the renal pyramid by the studies of Randall and other workers we have been unable to find any published material quoting the exact frequency of microscopic calculi in the pyramids of the Lidneys or an adequate description of their origin morphologic characteristics or possible significance Most of the significant work has been done on the macroscopic patches or plaques appearing on the surface epithelium of the pyramid which points into the cavity of the renal pelvis

We shall therefore define a microscopic cal culus as a deposit of calcareous material ap pearing in the substance of the kidney of a size sufficient to be seen easily under the ordinary low power microscopic lens and measuring at least five to aix times the size of

the tubular cells

For the original purposes of this study un selected diseased kidneys removed surgically at the Mayo Clinic provided a basis for the conclusions. Kidneys which had been re moved because of tuberculosis pyelonephri tis hydronephrosis or stones were studied As the work progressed it became evident from the findings that grossly normal kidneys removed at necropsy should be included Accordingly such a group was secured and studied in the same manner

Careful histologic search was made for microscopic calculi in each pyramid, after the pyramid was cut sectioned stained with hematoxylin and eosin and mounted Cal careous deposits were sought on the basis of the foregoing definition When a calculus was found, careful scrutiny as to the possible histogenesis was carried out. If the particular pyramid in one kidney did not show a plaque

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Abelian Company of the Company of the Company of the Resulty of the Graduat School fibe Huwardty of Minamenta, in partial failaillinear of the requirements for the degree of M S. in Surgery.

further sections from other pyramids of this same kidney were studied in an effort to find such a lesion This procedure was continued until the calculi were found in each kidney or their absence was shown beyond a reasonable doubt

Randall noted the microscopic plaques and The vast majority of papillary cal cium salt deposits have been found to be intra papillary and innocent of further pathologic

change

Vermooten made histologic preparations of the papillae from 103 Lidneys which showed the grossly visible plaques on the surface epithelium of the pyramid. He noted the deposition of calcium in the collagen fibrils of the renal papillae in many of the sections but he did not state the exact frequency of this finding

In 1862 Henle recognized deposition of calcium salt in the renal substance termed these deposits calcium infarcts and pictured the lesion as a complete filling of the tubules with chalk

In 1904 Beer made a macroscopic and microscopic study of 100 kidneys removed at necropsy and concluded that deposits of lime in the kidney were a very common pathologic condition. He stated that lime is found in the tubular epithelium as fine granules. He found the deposits only in the parts of the kidney which he felt were diseased. He spoke of the lime being deposited in fine granules through out the parenchyma of the kidney He found calcium deposits in 53 per cent of his 100 cases but never among persons less than 24 years of age

In 1933 Huggins studied surgically removed kidneys all of which had come to operation because of massive stones. He described deposits of calcium beneath the epi thelium of the collecting tubules.

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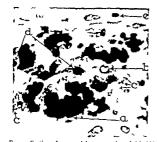


Fig. Section of pyramal from a pyriorephritic kidney a represents a small coalescing plaque of the type considered as manimal evidence of positive calcurrous deposition k in phagocytic cell sith timp bit of ingested calcurrous material and c' are interpreted as hits or facial "of calcurrous material sich may subsequently be absorbed by phagocytic cell d'expresents "dropeter" absorbed by phagocytic cell despertations of the cell absorbed by phagocytic cell despertation of the cell absorbed by the cell and the cell and the cell and the cell cell membrane but which have and yet coalesced into microscopic calculus as X-50 a.

the cortex or medulla of the kidneys from 1 500 necropsies In most of the cases a single section of each kidney was studied microscopically the section containing a portion of cortex, medulla, and renal papillae. He reported 12 per cent as showing microscopic calcium deposits. He felt that microscopic calcium

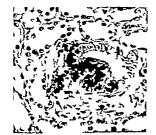


Fig. 3. A tiny calculus which is situated just outside the tubule and seems to be pressing on the still intact human of the tubule.  $\times 3$  o.



Fig. 2. Confession, states. Section of renal pyramid listciarty demonstrates. Biappe s high is made up by the confessione of many droplets, each containing chicaress states in a contine of all the droplets can fall be seen. In some the cell outline is still visible. a, The microscopic cacinum about the border of a high can be seen the outline of the droplets. It planecytes containing bits of bise-black calcuraces material. X you.

calcium was more likely to be deposited in the cortex than in the medulla or papillae

In 1940 Rosenow reported a study of the kidneys from 200 consecutive necropsies per formed at the Mayo Chine. Particular search was made for the grossly visible patch on the tip of the papillae. He then selected 24 papillae which did not show evidence of gross plaque formation and studied these histologically. Only 4 of the 24 papillae showed intramedullary calcification.

Kjøihede and Lassen examined 135 kidneys removed at necropsy and stated that in 49 of the cases neither macroscopic nor microscopic examination revealed deposits of calcium in or on the panillae.

Posey studied the papillae of 340 kidneys removed at necropsy and noted microscopic deposits of calcium in several of the cares.

### ORIGIN OF MICROSCOPIC CALCULA

Calcareous deposits stain bluish black with hematoxylin and eosin. The kesions under discussion are not of sufficient suze to require decalcification since they fix and section easily and are visible under the low-power microscope (X100) Photomicrographs are shown to fillustrate the lesions.

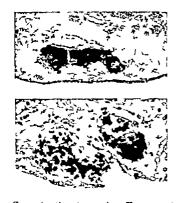


Fig. 4. Amorphous riage. a, above. This increasing calculus is located just under the epithelium at the tip of the renal pyramid. It is almost completely amorphous, aboving noise or very little, of the outline of the original droplets. It is situated where it might easily observationable through, remain attached and form the ridus on which the supersaturated saits of the urine of the callies might be deposited. X13.b. The epithelium overlying the calculus has been croted away and the area is exposed to the urine of the calcules. X32b.

Since these deposits were not described completely in any of the literature that we read the morphology and apparent developmental cycle of the plaques are outlined in this discussion in some hitherto unused terminol ogy. These terms include flecks of cal careous material droplets ingestion stage coalescing stage and amorphous stage.

Ingestion stage Phagocytic cells which are probably macrophages are abundant about the tubules of the kidney Lirkman has made an excellent review of the work done on macrophages in the kidney Phagocytes are shown in Figures 1b and 2b Bits of blue black staming material can be seen in the cytoplasm of the cells. In Figure 1c and c can be seen flecks of calcareous material which have not yet been ingested by the phagocytes. This may be a result of the cohesion of reabsorbed calcium salts since there is a concentration of calcium about the kidney



Fig 5 Microscopic calculi in the renal cortex. X130.

tubules The ingestion stage refers to the process of ingestion of flecks of calcium by the phagocytic cells which are probably macrophages. This is assumed to be true on the basis of what is demonstrated many times in the sections used in this study such as that shown in Figure 1.

Coalescing stage These droplets of cal careous material clearly coalesce to form plaques The still remaining borders of the many tiny droplets which went to make up the plaque can be seen still present about the borders of a high percentage of the plaques (Figs. 1a 2a and 3)

Amorphous stage It appears from the study of many sections that the tiny calculus tends to become amorphous losing the semicrcular outline of the original droplets which went to make up the entire plaque Such a calculus is illustrated in Figure 4a

Subeptibelial calculs Figure 4a shows an amorphous plaque located just under the epithelum at the tip of the renal papilla. This is of the type which Vermooten has suggested may ulcerate through the epithelum and form the nidus for a stone according to Ran dall's hypothesis of formation of stone.

Figure 4b demonstrates the ulceration of the epithelium by a calculus which originated just under the epithelium. The calculus has ulcerated or croded away the epithelium thus exposing the plaque to the salts of the unne

TABLE I.—RESULTS OF THE COMPLETE STUDY ON THE GROSSLY NORMAL AND THE SURGI CALLY REMOVED DISEASED KIDNEYS AS TO FREQUENCY OF THE MICROSCOPIC CALCULI

Type of kutacy	k.ni neys	Average number of sec- sors per kidney studied to prove the prevence of the microscopic calcul-	Total worm ber of sec isom mark
Pyclonephetue	57	7	
Hydrosphetic	76	17	
Calculous	, ,	3 E3	-
Pabercalous	24	3.0	9.2
Growly sormal	, po	3 60	7
Fotal	64	74	0 300

All patients were a years of age or more. All kidneys aloned the

Cortical calcul: The cortex of the kidney was not intentionally included in this study but in cutting pyramids the tissue of the cortex was frequently included. The interpretation placed on the finding of the calculi about the glomeruli is that reabsorption of calcum may occur in any part of the tubular system which includes of course the convoluted tubules.

Vermooten expressed the belief that these calcareous deposits occur in the collagen fibers of the renal papilla. With this we would have no argument except to point out that to us they seemed to occur anywhere (Fig. 5) except within the lumen of the tubule A few specimens were found with the deposits within the tubules but it seemed to us that they had croded into the tubule from the surround ing parenchyma. Caution must be observed in the interpretation of location since the studies in three planes which would have been afforded with senal sectioning were not used Figure 3 shows a calculus which is outside the lumen of the tubule but seems to be pressing into the lumen and perhaps in time would have eroded its way into the tubule itself It would have then been exposed to urine and might have grown to form an interparenchy mal stone.

Randall Vermooten and Rosenow have very carefully followed the fate of the plaque after it appears grossly visible while attached to the tip of the renal papilla. That study is not a part of this work. Macroscopic plaques which were attached to the tip of the renal papilla were observed but their frequence was not recorded

### FREQUENCY OF THE DEPOSITS

The results of the study as to frequency of the deposits are shown in Table I On the average it was necessary to cut and stud fewer than 4 histologic preparations on each idney to prove the presence of the microscopic calculi in all of the kidneys. As man as to sections of some kidneys were cut befor the lesson was found but in more than 50 pecent of the kidneys the calculi were found in the first section studied. We conclude the these microscopic calculi probably occur in the kidneys of all people above the age of 10 years kidneys from the very young were not made a part of this report. The age varied from 9 years to 70 years with a mean of 43 years

It is interesting to note in passing that the conclusions of this work were arrived at by studying an average of 1/3,333 part of the total pyramid area of each kidney. This figure is easily deduced from the information that each section is only 10 microns (0 or cm.) in thickness and the knowledge that each kidney contains about 10 pyramids each of which is about 1 centimeter thick. To study all of the papillary area of only one kidney might require as many as 10 000 sections. However this would probably not be necessary in actual practice, since the calculi probably extend over the thickness of man sections.

### SIGNIFICANCE

Certain generally accepted postulates regarding the physiology of the kidney will be correlated with the findings of this work in suggesting an interpretation of the causation of kidney stones. These postulates will be defended by references to the work which has been done on physiology and pathology of the kidney.

Postulate 1 The concentration of calcium (and related ions) is high in the tissue fluid about the renal tubules.

Postulate 2 Phagocytic cells occur in abundance about the renal tubules. Most work indicates these to be macrophages. Macrophages have been shown to have 2 definite affinity for calcium

Findings (1) Phagocytic cells are demon strated in the process of ingesting calcium in the renal pyramid (Fig. 1b ingestion stage) (2) 'Flecks of calcium are shown about the renal tubules. These flecks are apparently outside the walls of any cells. (3) Droplets of calcium are shown within the confines of still present phagocytic cell membrane (Fig. (4) Small calcareous plaques are shown about the edge of which can still be seen the rounded borders of the many droplets which went to make up this coalesced deposit (Fig. 16 coalescing stage) (5) These microscopic calcult were found in all of the kidneys. The patients were all o years of age or more. The lesions were sometimes found in the first section made on a kidney Sometimes as many as 10 sections were necessary to demonstrate this finding On an average something more than 3 sections were made on each Lid nev Six hundred and twenty nine sections were made of 168 Lidneys. (6) Amorphous calcult were found which had entirely lost the outline of the original droplets or cells (7) Subepi (Fig 4a amorphous stage) thelial calculi were found which had entirely lost the outline of the original droplets or cells and were located just under the epi thelium at the tip of the renal pyramid (Fig 48) (8) Deposits were found eroding through the epithelium at the tip of the papilla and yet remaining fixed to the papilla (Fig. 4b)

Interpretation (1) The study suggests that these microscopic calcult occur in practically all people, as a result of the physiologic proc cas of phagocytic ingestion of the reabsorbed calcium by the kidney tubules. (2) Renal calculus may be a systemic or a dietary discase and not a disease of the kidney per se This assumption follows from the fact that although this tiny calculus which may act as anidus, is present in practically all people not all people have symptomatic renal calculi The finding of the tiny calculi in the process of ulcerating through the epithelium at the tip of the renal papilla and yet remaining firmly fixed to the papilla and bathing in the salts of the urine of the calices and receiving deposits therefrom would seem to substantiate the findings of Randall Vermooten and others that these plaques may form the nidus of

renal calcult. This seems especially striking when it is considered that only a small part of the actual pyramidal area of each kidney was actually studied in this work (1/3 333) and yet all kidneys were found to have these tiny microscopic calculi The answer may lie out side the kidney itself. We may suppose that some substance appears in the urine or blood which acts as a catalyst to the formation of a stone of sufficient size to cause symptoms this catalyst causing the salts of the urine to be precipitated on the aforementioned nidus Perhaps the unknown substance causes the epithelium to ulcerate thus exposing the plaque to the unne Really, most microscopic calculi are subepithelial. The forma tion of symptomatic calculi could be due to the absence of some vitamin like substance or the presence of some other unknown or known substance from the general metabolism of the body or from the diet

Defense of postulates Postulate 1 is that the concentration of calcium (and related ions) is high in the tissue fluid about the renal tubules Practically all of the blood supply of the tubular system of the kidney consists of blood which has previously passed through the glomerulus. Cowdry and Shonyo and Mann have made exhaustive studies of the vascular tree of the kidney by the injection corresion technique and have demonstrated that practically all of the arterial blood reach ing the capillaries surrounding the different parts of the tubules is blood which has passed through the glomerulus before it reaches the renal tubules That there are a few exceptions is not to be denied but that these few exceptions constitute a very small part of the tubu lar circulation seems also well substantiated Therefore the efferent arterioles of the renal glomerulus carry blood which is soon to pass close to the epithelium of the entire tubular system clear down to the end of the collecting tubules at the tip of the renal papillae.

The function of the glomerulus, it seems well proved by the work of Richards is to filter off by selective osmosis a protein free filtrate of the blood plasma. The constituents of the glomerular filtrate are grouped into three classes (a) high threshold substances which are actively reabsorbed (sodium, po-

tassium calcium magnesium and chlorine)
(b) low threshold substances and (c) non
threshold substances. For the purposes of
this paper we are not interested in the last
two classes.

The high threshold substances are in low concentration in the urine and in high con centration in the reabsorbed fluid. This con clusion is drawn from the following reasoning Richards pipetted off the glomerular filtrate and found that it consisted of a simple protein free filtrate of the blood plasma. As blood passes through the glomerulus, it forms concentrated blood which passes out of the kidney through the efferent arteriole and glomerular filtrate which starts down the tubular system. Two elements of the blood in the first part of the efferent vessels will now be in higher concentration namely the cells and the proteins. The other substances have simply filtered across the osmotic membrane of the glomerulus and remain in the same concentration in the glomerular filtrate as in the blood of the efferent arteriole. The concentration of these ions is therefore unchanged in either The blood now starts its way down the efferent vessel and passes beside the tubules where the high threshold substances are reabsorbed. Therefore the concentration of these high threshold ions should be high in this blood. Also if the concentration of these easily diffusible ions is the same in tissue fluid as it is in the plasma, the passage of these ions from the glomerular filtrate mentioned previously should increase their concentration in the tissue fluid in the cells and tissues about the tubules as it is reabsorbed. Of course, much of the water is reabsorbed along with the ions but some must go out to form urme This is estimated to be about 1 cubic centimeter of urine for every 100 cubic centimeters of glomerular filtrate.

Most anatomsts and histologists today feel that reabsorption takes place in the convoluted tubules and in the loop of Henle but not down in the tubules of Bellini. Their assumption is largely based on the histologic appearance of the epithelium in the tubules of the collecting type. The epithelium is flat tened and undifferentiated in appearance. It does not appear like epithelium elsewhere in

the body which does carry on active reabsorption. However the pyramids contain the
lowermost pole of the loop of Henle. As
Lowsley and Kirkin stated, 'The pyramids
are composed of Henle's loops and the
straight collecting tubules. We see that reabsorption by the straight collecting tubules
is not essential to the completion of the
hypothesis and would not be in disagreement
with the finding of calcarrous plaques well
down at the papillary tip Perhaps the
straight tubules do carry on some of the
functions of reabsorption.

The question may arise as to the real sg nificance of this supposed high concentration of calcium near the tubules. Some may feel that this concentration is not much higher in actual milligram equivalents than the increase in concentration which occurs with the daily variations of the alkaline tide. Perhaps thus is true but it must be pointed out that the concentration of reabsorbed calcium would probably be even higher at this high peak of the day. Perhaps this is exactly the time when the phagocytic cells do absorb the particles of calcium.

Postulate 2 is that phagocytic cells, what seem to be macrophages, occur in abundance about the renal tubules and that macrophages have been shown to have a definite affinity for calcium. A complete review of the subject of macrophages in the kidney is to be found in the work of Kirkman published in 1945 Kirkman also attuded the kidneys of rate 35 days of age. The average number of macrophages per square millimeter throughout the pyramid medulla, and corrier respectively

was 53 93 and 14
Gersh in 1938 studied the liver and noted that macrophages of the liver as well as those of the spleen had a special affinity for calcum compounds.

Our final interpretation of this study is that in the process of reabsorption of high threshold substances (calcium and related four) these substances are engulied by phagoytic cells, which may be macrophages. These sour may first cohere in small masses or 'ficels, as shown in Figure 1 before being engulied by the individual macrophage. Soon the cell contains so much of the metal that it loses its

identity and forms spherical droplets. By cohesive attraction these droplets come together in groups to form a tiny calculus or plaque which we have chosen to call a microscopic calculus. The outlines of the droplets which came together to form the calculus can still be seen about the border of the lesion Finally all identity of the original droplets is lost in the amorphous plaque. We conclude that this occurs in practically all kidneys. If then these tiny calculi are present in everyone and are found ulcerating through the cou thehal membrane of the papillary tip in as high a percentage as is suggested by Randall Vermooten and Rosenow why does not symptomatic renal calculus occur more fre quently? We feel that perhaps the inciting factor may lie outside the Lidney itself and may be a systemic or a dietary factor

When this calcareous plaque of the type occurring in almost everyone breaks through the epithelium at the papillary tip it is exposed to the bathing salts of the urine and thus may form a layered concretion or stone which may ultimately break loose and form a symptomatic calculus. That urinary calculiconsist predominantly of more than one component is confirmed by Thompson and his associates and by Higgins. This fact lays the foundation for supposing that this microscopic calculus may well serve as the nidus for any type of stone whether it be oxalate urate xanthine cystime carbonate or phosphate when the proper inciting factor comes along

### STERNARY

A study was made of microscopic calculi as found in the pyramids of 168 kidneys. These included surgically removed kidneys and grossly normal kidneys removed at necropsy. The diseased kidneys were removed for tuberculosis, hydronephrosis, pyelonephritis or stones. Six hundred and twenty nine histologic preparations were made. Originally only one hematoxylin and eosin section of each kidney was studied. Failure to find the microscopic calcula after study of the section from any particular kidney was followed by the cutting and section of further pyramids from the same kidney until the plaques were found or their absence was proved beyond a

reasonable doubt All of the kidneys were from patients more than 9 years of age. In 50 per cent of the kidneys the plaques were found in the first section studied. In some kidneys as many as 10 histologic preparations were made. The microscopic calculi were found in all of the kidneys.

These microscopic calculi were studied as to morphology and possible histogenesis. It was demonstrated that they were formed by the coalescing of numerous "droplets of calcare ous material These droplets seemed to be formed by the process of phagocytic ingestion of tiny flecks of black staining material Attention was directed to the postulate that the concentration of calcium is probably high in the tissue fluid about the renal tubules and to the fact that phagocytic cells occur in abundance about the renal tubules these data it was suggested that the calculi were formed by the process of phagocytic ingestion of the calcium which is reabsorbed by the renal tubules

It was shown that the tiny calcule occur throughout the renal parenchyma. Some were located just under the epithelium at the tip of the papilla and one photomicrograph demonstrated the plaque ulcerating through this epithelium and becoming exposed to the urine of the calices. It is now fairly well accepted that some renal calcula are formed by the process of the salts of the urine being de posited in layers on these plaques. Since a chemically pure calculus is very rare the suggestion is made that perhaps many different types of stone may have this tiny calculus as a nidus.

Since these microscopic calculi occur in practically all people even though only 1/3,333 part of the total pyramidal region of each kidney was cut and examined the question was raised as to why then do not more people form symptomatic stones. The interpretation was suggested that large stones may form only when some inciting factor comes to the kidney which causes the salts to deposit on this eroded nidus plaque. Perhaps this incit ing factor substance or catalyst the absence or presence of which is necessary to cause deposition to occur comes from outside the kidney. From the foregoing data the pro-

posal was made that perhaps renal calculus is a systemic or a dietary disease and not a discase of the Lidney per se

### REFERENCES

ANDERSON, W. A. D. J. Urol., Balt., 949, 44, 89-34.
2. HERR, EDWIN, J. Path. Bact., Lond., 1904, 9, 225, 233.
3. COWDIN E. V. Special Cytology, the Form and Functions of the Cell in Health and Disease. Vol.

- pp. 07-074. New York Paul B Hother Inc., 938

  4. Greent, I Am. J Physiol., 1938, 21 889-594

  5. Histir, F. G. J. Zur Anatonie der Mere. Pp. 125

  133. Goettingen Nachrichten, 863
- 6 Hrogers, C. C. J Urol, Balt., 1938, 40 184-192
  7 Hoodes, C. B Arch, Sorg 1933 27 203-2 3
  8 Kreeken Hablet Am. J Anal., 1943, 73 451 482

- 9. Kysteron, K. T. and Lassen, H. K. J. Urol., Bat. o. LOWELT O S., and KIRWIN, T J Chickel Undogs
- ad ed., Vol. s p. 73. Baltimore The Williams & Wikins Co., 1944 1 POSET L. C. J Urol., Belt., 1942, 48, 300-100.
- s. RANDALL, ALEXANDER. Pennsylvania M. J. 104
- 44 838-840. 13. RECLARDS, A. N. Proc. Roy Soc., London, 435,
- 110 505-432.
  4. ROSENOW, E. C., Jr. J. Urol., Balt., 949, 44, 1948.
  15. SHONTO, E. S., and Mann, F. C. Arch. Path., 1944.
  - 38 287-296.
- TROMPHON, H. E., STRADMAN, L. T. BENJANCK, J. A., and SCOTT, W. W. J. Urol., Balt., 944, 51: 57-171.
   VERMOOTEN VINCENT J. Urol., Balt., 942, 45 27-

# RESECTION OF THE RECTUM WITH RECONSTRUCTION OF CANAL THROUGH THE PERINEAL APPROACH

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ESECTION of the rectum with re construction is presented as an alternative method of dealing with - some lessons of the rectum abhorrence of a colostomy by some patients when they are told they have a cancer of the rectum is sufficient to decide them against having operation. The surgeon as well may have some qualms regarding the operation of abdominoperineal resection of the rectum for some reason such as early malignancy small malignant polypi, ulcers which are of doubtful nature, etc. If a smaller operation without colostomy and good prospects of a return of function would suffice it would place both the surgeon and patient in a happier frame of mind

The investigations of Davis and Coller have shown that if a carcinoma of rectum or sig moul has metastasized beyond the pararectal lymph nodes the next extension may just as well be in the liver or some remote region as in the next lymph node namely the inter medial or central groups. Therefore it is reasonable to believe that, if there are no metastases beyond the paracolic lymph nodes adequate excision of the colon including the primary lesion together with the epicolic and paracolic lymph glands offers almost as good a prognosis for cure as does a wider resection including the intermediate and central lymph nodes

With that belief in mind it was considered that in certain selected carcinomas in the rectum, which are not fixed to surrounding structures which are not producing obstruction which have produced no obvious metastases, and which are either a cauliflower or an ulcerative type of lesion involving not more than one-third to one half of the circumference of the rectum a local resection and reconstruction might have many advantages

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These advantages might be (1) normal rectal and anal sphincters would be retained with subsequent normal control of the bowels (2) no colostomy would be required (3) the shock of operation would be greatly dimin ished (4) the danger from infection would be diminished (5) postoperative complications would be greatly reduced

A group of patients have been treated in this way and the case reports are presented

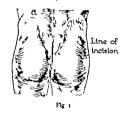
To select the cases suitable for this procedure it has finally been decided that the ideal case is one in which the growth is above and not involving the sphincters or anal canal mucosa. The growth should be easily pal pable through the rectum and for a transacral resection the upper margin of the growth must be palpable with the finger in the rectum and be freely movable on surrounding structures.

### OPERATIVE TECHNIQUE

An incision is made from the third spine of the sacrum down to within half an inch of the posterior anal margin. The coccyx, the fifth, and half of the fourth sacral bodies are removed The pelvic fascia is divided dissection is carried around the circumference of the rectum outside the pararectal fascia. When a tape has been placed around the rec tum gentle traction and digital dissection will draw down the upper portion of the rec tum and sigmoid The peritoneum is opened on the anterior surface and sufficient sigmoid is drawn down with which to do a repair with the remaining lower structures of the rectum When this has been accomplished the peri toneum is reattached by sutures to the an terior wall of the sigmoid at a new level higher up. The field is then well dusted with sulfathiazole powder and after the field is thoroughly packed off the rectum is opened well below the growth which is palpable within the lumen. On inspection through this opening if the growth is not within 11/4



Position of patient on table



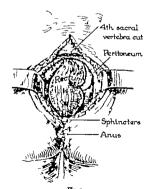
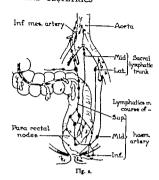


Fig. 3.

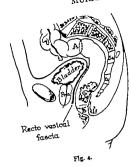


inches of the site of section, the rectum is divided completely across. The sigmoid is divided across well above the growth and this section of rectum with its surrounding para rectal fascia lymph glands, and lymphatos with the contained growth are removed. It is an casy matter then to do an end-to-end suture between the lower end of the divided sigmoid and the upper end of the remaining rectum. The suture material used has been chromic cateut A single layer of full thick ness sutures has been used. Over the poster юг surface some supporting sutures in the fat and surrounding structures have also been applied

A soft drainage tube is passed down to the cavity below the tip of the sacrum. The levatores am are closed and if some of the fibers of the sphincters of rectum have been divided these are repaired and the skin closed. Digital examination will now demostrate the sutrue line surrounding the rectum and a hard rubber tube \$\xi\$ inch in diameter is passed through the anal canal through the site of amastomosis, and into the proximal segment. This is stitched to the anal margin. No colostomy is required.

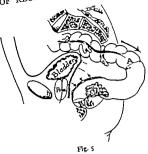
There have been no fatalities in this group. The patients stood the operation without shock and within 2 or 3 days were feeling

# RESECTION OF RECTUM MURRAY



quite normal There has been no peritonitis, or other serious complications. All the pa tients have had control of the rectum. There has been serous discharge from the sacral draunage in all and in some there has been suppuration with purulent discharge but in most this has healed There has been no osteomyelitis of the sacrum There has been no stenosis. In I case in which the growth was slightly higher up so that its upper mar gin could be scarcely felt, there was slightly more tension than is advisable at the suture line. In this case the patient developed a fecal fistula which discharged through the site of the sacral dramage tube for 10 days. It then closed spontaneously without further The patient made an ex cellent recovery and has normal function of complications In another patient in whom there was a larger growth requiring resection of a greater length of rectum and which probably was not suitable for this procedure, there was a separation of the suture line around half of the circumference of the rectum fecal fistula developed and has persisted for 4 months through which a small quantity of feces discharged daily

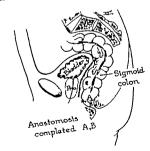
What the end may be is not known and a colostomy may be necessary before the con dition is cleared up In half the cases, a tem porary fecal fistula developed but this healed spontaneously with 1 exception within 3 weeks. In none of the cases was a colostomy performed



# CASE REPORTS

CASE I O M female aged 65 years, was ad mitted to the hospital March 9 1942 For 3 months this petient had had rectal bleeding On digual ex amination her doctor found a small mass 134 inch in diameter, 3 inches within the rectum showed this to be adenocarcinoma. Three inches of rectum, proximal and distal including the growth were excised and an end to-end repair carried out. The specimen showed no invasion of regional lymph nodes. The patient was discharged on March 24, 1942 The incuion had healed There was normal control of the rectal sphincter and colon function was normal in all respects.

This patient is still well without signs of recurrence and with normal function now 3 years following the operation



Flg. 6.

CARE 2 A H aged 35 years was admitted to the hospital on March 22 to 14. The patient had typical symptoms of carcinoms of rectum which were demonstrated on digital examination. He had lost 30 pounds in weight. There was marked see ondary anemia with a bemoglobun of 34 per cent. He was sleeping pootly and was in constant distress from the rectal lesion. A large mass survounding two-thirds of the circumference of the rectum, ul cerated in its center was easily palpable. It extended downward beneath the mucosa of the anal canal on the postgrolateral supect. The mass was not fixed to

surrounding tissues Through a sacral approach the rectum was ex posed It was demonstrated on palpation that the mass was extending in the submucosa deep to the external aphincter of rectum. The question arose whether an adequate resection could be carried out locally or whether an abdominoperineal resection would improve the prospects of care. It was felt, however with the possible muscle invasion that the prospects for cure under any condition were not good A local resection was carried out when the posterior half of the rectal and anal sphincters together with rectum and growth were removed. An area of anal mucosa a inches by I inch was left on the anterior wall. The anal canal was reconstructed and the external sphincter reconstructed around this. The lower end of the sigmoid was anastomosed to the end of anal canal Microscopic studies demonstrated this growth to be an adenocarcinoma with ravasion of regional lymph nodes. The patient made an uninterrupted recovery and left hospital with the incision healed in a weeks. There was normal control of the anal and rectal sphincters and the patient had normal colon function.

The patient's general health improved and he returned to work. He returned in a month complain ing of pain in the region of the left hip. X ray films at that time showed an area of rarefaction in the femut which had the appearance of a metastatic growth in bone. While the patient continued at work for a year this growth in the femut enlarged until finally there was a pathological fracture. The patient finally succumbed to generalized metastases of peritoneal cavity and skeleton. There was a small local recurrence of the growth in the anal region during the last few months. With local radiation this was controlled and caused no further symptoms.

It is doubtful if a more radical operation would have made any difference to the incidence of metastases as these almost certainly were present before the operation.

CARE 3 J B aged 70 years, was admitted to the hospital in August 1941 The patient had a malig ant polyp 2% inches in diameter on the positrior wall of the rectum 2 inches from the anal margun.

Through a posterior approach the involved seg ment of the rectum with a inches distally and a inches proximally was excised together with the lymphatics and lymph giands. Sulfathlande was applied and a drainage tube inserted. The skin is calon was healed in 10 days. There was no firmla The suture line in the rectum healed completely without atenoris.

The patient has normal control of the bowel and rectum. Analysis of the specimen showed it to be polypoid adenocarcinoms. There were no metastases in the regional lymph glands removed

CASE 4 C S aged 55 years, was admitted to the bouplial on September 4, 1945. This patient had an ulcerating cardinoma in the antenor wall of the return beginning 136 inches above the sphineter region. The growth was 354 inches in length by 136 inches in width. It moved fairly freely over the vaginal wall anteriorly

Through the posterior approach the mass with a inches of the rectum proximally and a linde distily was removed together with the surrounding latacia, lymphatics, and lymph glands. An end-to-end suture was carried out without difficulty. The suture line was completely bettled within a week. There was no fistula. The patient had normal out tool of bowel and rectum. There was no stenois as examination. Dissection of the specimen aboved this to be an adenocarcanoma with invasion of the placelies.

Now 21/2 years following the operation there is no evidence of recurrence either locally or generally

CASE 5 E. T. O. aged 63 years, was admitted to the boupital on October 18 1943. A malignant polyp 2% inches in diameter attached to the auterior wall of the rectum was identified. Biopyr described this as a polypoid carcinoma.

Through a posterior approach a length of inchin of rectum and lower signoid was removed with the surrounding lymphatics and lymph glands with the growth in the center. An end to-end seture was carried out without difficulty A drainage tab was passed down to this area. The suture line was conjectly healed in 1/8 weeks. There was no first. The patient had normal control of the rectum showed. The suture line was healed satisfaction? There was no eridence of the control of the rectum showed the control of the rectum showed control of the rectum showed in the control of the rectum showed on invasion of regional lymph glands.

CARE 6 E. B aged 73 years, was admitted to the hospital on December 15 1043. The patient had an adenocarcinomatous ulcer in the posterior wal of the rectum 4 inches from the anal margin. Then was no cridence of metastases.

Through a posterior approach the involved sement of rectum with 5 inches of colon proximaly set 2 inches distally was removed with surrounding it, lymphatics, and glands. This was at the apper margin of the point at which the resection by this method could be carried out. However a satisfactory end to-end repair was completed although there was somewhat more tenson at the suture line than was desirable. The patient developed a fecal fistula which lasted for ro days at which time it healed. The skin incusion was completely healed in 3 weeks. The patient had normal control of bowel and rectum. There was no stenous and no evidence of new growth 1 year following the operation. Anal vas showed this to be adenocarcinoma involving the muscular coats and with no invasion of regional lymph glands.

Cast 7 A. D., aged 60 years was admitted to the hospital on January 7, 10.14. This patient had symptoms typical of carcinoma in the rectum. On examination there was an ulcerated area on the positerior wall, the growth measuring 3.5 centimeters in diameter. It was freely movable and it was though that it was suitable for a local resection.

Through a posterior approach the rectum with the pararectal fascia lymphatics and adjacent lymph glands was dissected free. Seven inches of the lower aigmoid and rectum was removed with the malignant mass in its center. An end to-end suture was carried out without difficulty giving a satisfactory repair Sections of the specumen showed it to be an adenocarcinoma with metastases in the para epicohe lymphatics but none in the immediate lymph glands which were removed. The incision was healed completely in a weeks. There was no fatnia.

To date there is no evidence of recurrence. The patient has normal function of the bowels and con trol of the rectum.

CARE 8 A. O.G. aged 52 years was admitted to the bospital on June 7 1944. The patient had a malignant older on the posterior wall of the rectum 436 inches from the anal marein

Through a posterior approach the involved egment with 2½ inches proximal and 2½ inches distal
was removed. An end to-end suture was carried out
statisfactorily. The posterior incision was healed
completely in a weeks. There was no evidence of
fatula. The bowels and rectum were functioning
normally. Analysis of the specimen showed this to
be only a chronic ulcer which differed from the
original blopsy. There was no evidence of malig
nancy. There was no primary or invasion in the
regional lymph glands.

CARE O A N agest 28, care, was admitted to the bospital on August 17 1044. The patient had an ulcerated carcinoma in the posterior wall of the rectum 3 inches above the anal margin. It was lightly attached to surrounding structures, especially on the right posterolateral quadrant. There was no evidence of metastasses elsewhere

Through a posterior approach the involved aggment of the growth with s inches proximally and 3 loches distally was removed. A satisfactory end to-end repair was carried out. However there was more tension in the surver line in this case than was

desurable. Sulfathiazole was applied and a drainage tube was passed down to the site. The patient developed a fecal fistule on the eighth day which discharged a moderate amount of feces through the upper end of the incision. In the meantime the bowels were functioning naturally. On palpation through the rectum the posterior half of the suture line had separated leaving a gap of 1½ inches between these margins. The fistula continued to discharge small quantities of feces. Otherwise there was normal control of the bowels.

Now 7 months following the operation there is still a small fecal fistula over which the patient wears a small layer of gauze Otherwise the bowels are functioning nor mally. The patient's general health is excellent. There is no evidence of recurrence of the growth Analysis of the specimen showed this to be adenocarcinoma. The glands re moved from the perirectal area showed only chronic lymphadentis with no evidence of new growth

CASE 10 M M aged 62 years, was admitted to the hospital on August 17, 1044. The patient had a carcinomatous ulcer 234 inches in diameter in the posterior wall of the rectum 3 inches above the anal margin. It was fairly freely movable but still it was felt that there was slight attachment to the sur rounding structures, especially on the left postero lateral region. There were no evidences of metastasses eisewhere

Through a posterior approach the involved acg ment of rectum with 3 inches proximally and 2 inches distally was removed. The surrounding fat, lymphatics and lymph glands were removed. A statistatory end to-end repair was carried out. Sulfathiazole was used as in all these operations, and a drainage tube was passed down to the site. The incision was completely healed in 2/5 weeks. There was no fistula at any time. The patient had normal control of bowel and rectum. There was no stenosis on digital examination. The analysis showed this to be an adenocarcinoma. The regional lymph glands in the pararectal position showed no invasion by carcinoma.

CARE 11 T F aged 64 years was admitted to the hospital in August 1944. This patient had a polypoid carcinoma on the posterior wall of the rectum 4 inches from the anal margin. There was no evidence of fustion of the growth

Through a posterior approach the affected seg ment with the growth with 3½ inches proximally and 2½ inches distally was removed. A satisfactory end to-end repair was carried out. At no time was there a fistula. The incision was healed in 10 days. The patient had normal control of bowel and rectum. There was no sterois. The analysis of the specimen showed this to be an adenocardinoma. There was no

evidence of invasion of regional lymph glands CASE 12 M T aged 21 years, was admitted to the hospital on October 10, 1944. The patient had symptoms leading to the diagnosis of rectal polyp On blopsy this was shown to be a malignant polyp on the posterior wall of the rectum within an inch of the anal mucosa. This growth was treated in the radiology department by deep therapy and inter atitial radium application. The leaion appeared to be cured by this procedure. However, it left the pa tient with a radiation older 11/4 inches long and 14 inch wide in the posterior wall of the rectum ex tending down into the region of the sphincter posteriorly. As this had persisted for a year and a half and was causing a great deal of discomfort and disability it was suggested that an excision of this area be carried out

On October 10, 1944 the area was exposed through a posterior incision. The circumference of the rectum was defined and the area of ulceration localized. The posterior two-thirds of the circum ference of the rectum was excised by an elliptical incision including the ulcer This was repaired with a double line of autures. A drainage tube was passed down to this site after applying sulfathiazole crystals. Healing was quite satisfactory and was completely closed in 334 weeks. The symptoms were entirely relieved. On rectal examination the auture line was palpable. It was well healed. Cast 3 I. W. aged 55 years was admitted to

the hospital on November 13, 1944. This patient was demonstrated 6 months previously to have carcinoma of the rectum. It was adherent to sur rounding structures. It was treated by the radiolegists with deep therapy and with interstitial radium. The growth diminished in size leaving only a scarred area causing fairly severe stenosis 3 inches above the anal margin. He was seen in consultation with the radiologists when it was decided to make an attempt to resect this segment of the invaded rectum.

Through a posterior approach it was demonstrated that there was much more scarring in the tissue sur rounding the rectum than was found under ordinary conditions, probably as a result of the radiation therapy However it was not difficult to define a plane through which a dissection could be carried out surrounding the rectum, pararectal fascia, lymphatics and adjacent lymph nodes. The in volved segment of rectum with \$16 inches proximally and a inches distally was removed. An end-toend suture was carried out without difficulty Th incision was somewhat slower in healing. This might have been the result of the previous radiation However it was healed satisfactorily in 41/4 weeks. A fistule discharging only a small quantity of fecces developed for a period of 3 weeks. This finally closed. The patient had normal control of bowel and rectum and there were no symptoms. The analysis of the specimen removed showed that there were still carcinoma cells in the region imbedded in massive scar tissue. The lymph glands removed with the rectum showed no invasion by carcinoma.

CASE 14. G T B was admitted to the bosoital in March 1945. This patient clinically had car cinoma palpable with the tip of the finger on the anterior wall of the rectum. It was felt to be moder ately large and probably not very suitable for a perincal excision. However as the patient was firmly decided against having a colostomy it was decided to attempt removal by the perineal approach

At the operation it was found that the mass was fairly large, although there was no extension to lymph glands beyond the regional group which cou d be identified at operation. The man was re moved. The repair was carried out without much tension. A tube was passed through the anastomosis and post escral drainage provided. The patient stood the operation very well. The incision besled without injection. There was a slight feeal discharge for about 1 week. By the end of all weeks the incision and the fistula were completely healed. The patient had complete control of the sphincies at that time. There was no stenosis present at the suture line and the patient made a satisfactory recovery

The pathologist a analysis of the specimen showed this to be an adenocarcinoms of colon. The regional lymph glands showed no invasion by acondary growth. They showed only chronic by pa

adenith CASE 15. C C. aged 64 years, was admitted to the hospital in May 1045. In 1031 this patient bad had an operation for internal hemorrhoids at saother hospital. A polypoid mass 13/2 by 13/2 inches was removed. On section this was demonstrated by the pathologist at that time to be adenocarcinoma. The patient was quite free from symptoms enti-January 1945, at which time he began to have symptoms typical of carcinoma of rectum. On ex amination there was a polypoid mass which was situated in a position on the anterior and left lateral wall of the rectum where it could be palpated with the finger freely but its upper margin could not be felt easily There was one unpleasant symptom which was irritation of the bladder making our doubt if this growth were resectable. It was decided to attempt an exploration through the perioeum being prepared to continue to do an abdominal stage if the growth were not removable through the former route. It was found that the growth coold be quite freely detached from all the surroundist structures. It was brought down into the post sacral incision without difficulty. It was resected and a satisfactory end to-end repair was carried out without colostomy The patient made an anhier rapited recovery There was a fistula present for about 3 weeks. This healed and left the patient with a normal functioning rectum without as stenosis.

The pathologist's analysis of the specimen sloved an adenocarcinoma of fairly large proportions of the cauliflower type but no invasion of regional lymph giands.

### CONCLUSIONS

In early carcinoma of rectum extending as low as the anal canal, resection with reconstruction and preservation of the sphine ters without colostomy is a satisfactory nrocedure

2 The operation is attended by very little. shock or hemorrhage The patients all made a satisfactory recovery. There were no deaths

in this group reported

3 This report is based on 15 cases. With the exception of 2 cases all infection in the permeal wound had healed and signs of fistula had disappeared within 3 weeks. In one of the remaining two the fistula closed in weeks. In one other it was present at a months. What the end result in this will be is not yet determined. The prospects for cure in this group seemed fairly satisfactory This was based on the pathologist's evidence that there was no extension of the growth beyond the local lesion with possible infiltration of the surrounding muscular wall. There was a lymph gland invasion. All the patients had normal control of sphincters. There was no stenosis at the site of anastomosis. The rectum function was normal in all respects

One patient has died from recurrent growth with metastases in the peritoneum and bone causing a fracture of femur. This case Case 2 in this series was an unsuitable case as it was a very advanced carcinoma with in vasion of the anal mucosa and surrounding structures It is quite obvious however that any other type of procedure would not have offered any better prospects for cure

#### REFERENCES

I COLLER FREDERICK A, KAY EARLE B and Mac Better, Robert S. Surgery 1940 8 294. 2 Gabriel, W. B. Dutes, Cutherst and Bossiy H. L. R. Bitl. J Surg. 1933 23 395 3. Gilcheur Richard K., and David Vernon C

Ann. Surg., 1938, 108 621
4. GRAHAM, ALLEM Tr Am Proct. Soc. 1941 317 5. GERMELL, ROBERT S. Ann. Surg., 1942, 116 200. 6. KRASKE, P. Samml. Klin. Vortr., 1897 No. 183 and 184 (n. a. Chirurge No. 52 and 53) 771-851 7. Idem Arch. klin. Chir., 1966, 80 634

# STUDIES ON EXOPHTHALMOS PRODUCED BY THYROTROPIC HORMONE

I A Study of Exophthalmos Produced by Various Thyrotropic Hormones and the Influence of the Testes on the Exophthalmos

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ANI investigators have demon strated that thyrotropic hormone from the anterior pituitary may be used to produce exophthalmos in guinea pigs. Many of the observers have found that the exophthalmos was produced more easi ly in thyroidectomized than in intact animals. The problem of obtaining accurate measure ments of the prominence of the eyes in many of these experiments has been a major obstacle. Two improved methods for measuring minute changes in the prominence of the eyes have been devised and described elsewhere (6)

Using these two methods of measuring exophthalmos, a rather extensive investigation has been undertaken, first, to compare the changes in the prominence of the eves induced by various preparations of thyrotropic hor mone and second, to correlate the exophthal mos with the various tissue changes which occurred as a result of administration of the hormone. This report not only describes the effects induced by the administration of var ious anterior pituitary preparations on the prominence of the eyes in guinea pigs but also takes into consideration the influence of the testes on the development of exophthalmos.

The literature dealing with the relation of the gonads to exophthalmos is confusing because of the variety of ways which have been employed to produce exophthalmos. Marine (16-18) and Marine and Rosen (20) reported that exophthalmos did not develop in gonad ectomized puberal rabbits as it did in normal animals when thyroid insufficiency was pro-

Airklament of thesis submitted by Dr. Dobyna t. the Facelly of the Oraduate School of the University of Alfaneesta in part and Hillment of the reportments for the degree of Fb Dr. Sungery The work on which the their was based was done in the Division of Experimental Machine of the Mircy Foundation in the Internative of Dr. Goorga Mr. Buches of the Mircy Foundation in Dr. Dobyna, Fellow in Sungery Mayor Foundation.

duced by thyroidectomy or methyl cyanide They (17 21) found that the production of permanent cryptorchism with the associated degeneration and absorption of germinal epithelium of the testes did not inhibit this type of exophthalmos in rabbits. Spontaneously exophthalmic guines pigs did not show a regression of their exophthalmos after gondectomy They reported (11) that these types of exophthalmos could be instantly converted to enophthalmos by cervical sympathectomy This fact would serve to distinguish this type of exophthalmos from that produced by thyrotropic hormone, which is not influenced by cervical sympathectomy (32 33 36). No changes in body weight of the animals resulting from surgical procedures were described.

Smelser (33) reporting studies on exophthalmos induced by thyrotropic hormone re ferred to the fact that some of his male and female animals were gonadectomized. Spedal reference, however to the results in these animals was not included. Smelser (38) re ported that cophorectomy had no effect on the changes that were induced by thyrotrops: hormone in the hardenan glands of gunes pigs.

Marine (17 18) reported that sex hormones such as testosterone propionate, androsterost and dehydroandrosterone caused a return of the exophthalmos previously abolished by orchectomy

I described in an earlier publication (6) the increase in the prominence of the eyes after thyroidectomy in normal guinea pigi. In the preliminary experiments of this investigation. it was found that after thyroidectomy had been performed, preparatory to the adminitration of thyrotropic hormone, the eyes incressed in prominence. That series of observa

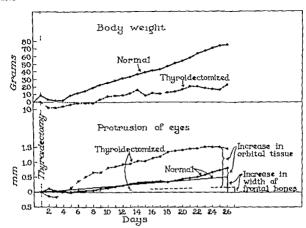


Fig. 1 Changes of the prominence of the eyes resulting from thyroidectomy in the normal guinea, pig. The increase in the width of the frontal bones, as illustrated in the lower right, is represented by the same socie as the measurements dealing with the eyes.

tions on the effects of thyroidectomy alone served as a control for the experiments to be described dealing with the effects of thyrotropic hormone.

The control experiment is very briefly reviewed and illustrated Seventeen growing male guinea pigs weighing from 322 to 500 grams were used. Thirteen were thyrodectomized and 4 served as controls The intercorneal distance and body weight of these animals were determined at intervals of from 1 to 3 days for 14 to 26 days. It can be seen in Figure 1 that thyrodectomy alone causes some increases of the prominence of the eyes.

### EXPERIMENTAL METHOD

The following anterior pitultary products were used in these experiments (r) antuitrin T prepared for clinical investigation (2) pur fied thyrotropic factor prepared for clinical investigation (3) a crude thyrotropic preparation from the anterior pitultary of swine prepared especially for this study and known to contain small amounts of other known in

purities and (4) the specific metabolic principle of the pituitary which was prepared according to the specifications of Collip and his coworkers (3 5)

Normal guinea pigs weighing between and 400 grams were selected from our Institutions tock colony. Animals showing any speciated colony. Animals showing any special color and greater facility in obtaining accurate measurements (6) animals which possessed a darkly pigmented white possessed a darkly pigmented which possessed a darkly pigmented animals which possessed and pigmented animals which possessed a darkly pigmented animals which possessed a darkly pigmented animals which possessed animals which possessed animals which possessed animals which possessed a darkly pigmented animals which possessed a

The intercorneal distance wa three times with each of the truntervals of 1 to 3 days. The arm of determinations represented the eyes for that particular day. Belia the way to be a fine and the commendation of the animal ectomized and, after varying

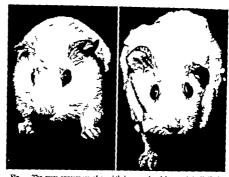


Fig. The gross appearance of excephthalmos produced by antuitrin T (Parke, Davis and Co.) a, left, Normal guines pigr b, thyroidectomized guinos pig treated with antuitrin T

were given one of the thyrotropic preparations at daily intervals. Approximately half of the animals in some of the groups observed were not only thyroidectomized but also orchectomized.

At the conclusion of these observations, the animals were killed and the tissues were studied grossly and microscopically with a variety of staining techniques. The results of the tissue observations will form the basis for subsequent reports.

### A. THE EFFECT OF ANTUITRIN T ON THE PROM INENCE OF THE EYES IN THE GUINEA PIG

Method Data assembled from 19 animals comprise the bears of the report on this thyrotropic product. Eight animals were thy roidectomized Seven were thyrodectomized and orchectomized. Four were normal and served as controls. Five to 11 days were allowed to elapse between the operation and the beginning of administration of antuntum T except that in 2 cases, in which the animals were both thyroidectomized and orchectomized 31 days elapsed before the administration of the hormone was begun. The animals received by either the intraperitioned or the

subcutaneous route, 0.5 cubic centimeter (1.0 c.c. in 1 case) of antuitrin T containing 25 Junkmann-Schoeller units each day for 3 to 32 days.

Antuitrin T when given in this amount (0.5 c.c. daily) was found to produce a rather tonce effect on many of the animals. For this reason its administration was on rare occasional discontinued for a day in order to permit the animal to regain its strength.

Because the literature contains contriversial opinions concerning the relations of vitamin C to the effects caused by thyrotropic hormone and because these animals were studied during the winter months, when guines pigs are often on the border line of scirry some data were assembled on the effects of giving vitamin C. Accordingly 5 animals were given 25 milligrams and 2 were given 5 milligrams of crystalline ascorbic acid daily interperitoneally during the time they received anturtin T. Ascorbic acid however failed to influence in any way the exophthalmos that developed

That amount of extract which when injected any or priors past respiring not by an extract course a recognition by proceed of the arthodoms and disreptenesses of called in the thyroid of an of a realizable (ct. ).

340

330

320

810

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290

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250

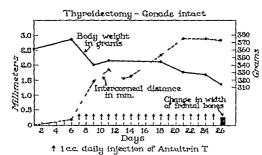
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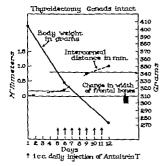


Fig. 3. The changes in body weight and intercorneal distance in animals receiving antuitrin T illustrated by the records of representative animals. Arrows indicate daily injection of antuitrin T a, above, Thyroidectomy—gonads intact—slight loss of body weight b left, below thyroid-

f 1cc daily injection of Antuitran T ectomy-gonads intact-extreme loss of body weight. (Ex tremes in influence of body weight are shown by a and b. influence of loss of body weight are anown by a and b.
Influence of loss of body weight on intercorneal distance is easily seen. Compare with Fig. 4 showing loss of body weight by fasting.) c, Thyroidectomy and gonadectomy

Thyroklectomy - Conadectomy

Body weight in grains

Intercorneal

distance

in mm

50

10

1.5

O.B

Hillimete.

Results Within 30 minutes to 1 hour after the injection of antuitrin T many of the animals appeared ill Their state was charac terized by inactivity and a ruffled coat. In 12 to 24 hours some animals demonstrated stiff ness of the limbs, which in some instances almost amounted to a state of cataplexis.

Definite gross exophthalmos occurred in most of the animals in spite of considerable loss of weight (Fig 2) The greatest actual increase in intercorneal distance was 3 5 milli

23486 7 8 9 10 11 12 13 14 15 Doys

111

meters. Although thyroidectomy per se re sulted in a protrusion of the eyes, the increase produced by antuitrin T was superimposed in a much more acute and striking fashion (Compare Fig 1 with Fig 3a and c.) With both of the methods of measurement employed there was obtained in most instances an un equivocal increase of intercorneal distance within 24 hours after injection

The removal of the testes had no inhibitory effect on the development of exophthalmos

TABLE	L-EVOPHTHALMOS OF ANIMALS	
	RECTIVING ANTUITRIN T	

	Days of treat seent	Weight loss, gm	Observed emple- thelmos, mag	Cerrec Lice for weight less, see	Cor rectage empts. thalmos, mra
		-re	H	+ ∞	ta .
		-54	s	+ 11	\$10
	70	-17	<b>→ 30</b>	+ 50	••
Thyredec	•	-47	10	+0 15	3 5
tomused	,7	~ 11	•0	+ ∞	3 00
		-39		+ 🗪	3 1
	9	+6	75		75
	7 -100 po + 19	+ 13	1		
	•	- Oa	3 5	+0 75	•0
	•	~-30	ره	+- po	1
Goondecto-	34	-4	••	+0 5	23
marri and thyroid-	_=	-39	75	+0 75	30
ectémased	4	-11	3 70	+0 75	4 5
	16	~ 30	75	+0 90	3
	_ 3	- 16	> 5	+0 71	30
		- 1	60	++ 75	75
Intact		-54	14	+	30
j	81	-134	8ڍ ⊷	+ 99	
	27		<b>J</b> 0	+0 15	£4

\*Treatment given on 7 of 5 day (Treatment given on 5 of a day)

(Fig 3c and Table I) As a matter of fact the two most striking degrees of exophthalmos occurred in animals which had been orchec tomized.

Control experiments. It is common knowledge that when an animal loses weight there is a recession of the globes of the eyes into the orbits. Because some of these animals lost rather striking amounts of body weight (Fig. 3b) further observations on the relation of changes in the body weight to changes in the prominence of the eyes were indicated. Fur thermore, it was necessary to know whether the solvent in which the active principle of antuitrin T was dissolved or the preservative present in the solution could cause exophthal mos or the toxic effects observed in these animals.

When the solvent 1 including the preser vative but without the pituitary ingredient,

The information accumuly for the preparation of the solvent for antual da T was obtained from the manufacture: was given in comparable amounts to 6 control animals there were no increases in the inter corneal distances nor were there evidences of a torne influence, such as hitherto observed a torne influence, such as hitherto observed

In a second control experiment the changes in the intercorneal distance were studied in animals whose body weights were decreased by fasting Food was withheld from 5 animals comparable to those used in the preceding experiment but drinking water was provided ad libitum These animals lost from 30 to 40 per cent of their body weight in 10 to 16 days. Their body weights and the changes in their intercorneal distances were recorded at fre quent intervals. As the retrobulbar time became depleted concurrently with atrophy of comparable tissue elsewhere in the body the globes of the eyes receded into the orbit. The correlation between the regression in the prominence of the eyes and the decrease in body weight is illustrated by a representative animal of this group (Fig 4) This illustration shows that for the first 40 grams of loss in body weight in an animal of this size there was a decrease in intercorneal distance equal to the amount a. For an additional loss of 40 grams of body weight an added regression equal to the distance b resulted and so on.

On the basis of these correlations between decreases in weights of body and regressions of eyes, correction factors have been devised for use in the interpretation of the eye messurements assembled from animals which had been treated with antuiting T and had lost weight. An animal which lost considerable weight when antuitrin T was administered is illustrated (Fig 3b) Although the prominence of the eyes in this animal (Fig 3b) increased relatively little, there was an emphthalmos-producing mechanism which prevented a regression of its eyes such as occurred in the fasting animal which lost a comparable amount of weight (Fig 4) With the application of the correction factors it has been possible to evaluate the exophthalmos producing effect of antuitrin T more accurately thus correcting for the loss of tissue volume in the orbit associated with loss of weight. Table I has been compiled in this way

It will be seen that 3 of the 19 animals sotained a slight decrease of the prominence of DOBANZ the eyes while receiving antuitrin T decrease however, was not of the magnitude of that sustained by a fasting animal losing the same amount of weight. On the other hand, some animals showed considerable in crease in the prominence of the eyes in spite of considerable loss of body weight. After a correction of the exophthalmos based on the loss of body weight it can be seen (Table I) that the exophthalmos produced in gonadec tomized animals was as great as that in am mals with testes intact. Except for 2 animals which were orchectomized and in which more striking exophthalmos developed the 2 groups of animals were essentially equal in this regard

In the 4 intact animals which received an turn T, there did not develop a degree of exophthalmos comparable to that of the thy rodectomized animals even though correction for losses of body weight was made. This difference may be explained at least in part by the data derived from control experiments which illustrated how thyroidectomy alone produced some increase of the prominence of the eyes.

The importance of accurately correlating changes in body weight with changes in the prominence of the eyes is clearly Loeb and Friedman and also Smelser (32 34) recognized a regression of exophthalmos in animals which lost consider able weight. It is common knowledge that thyroxine whether of endogenous or of exog enous origin, will cause a loss of body weight. Many authors have reported that exophthalmos was produced less readily in intact ani mals than in thyroidectomized animals. Absence of the thyroid presumably precludes the possibility of thyrotoxicosis developing when thyrotropic hormone is given. It has been pointed out by Marine (18) in intact animals and Smelser (34) in thyroidectomized animals that thyroxine when administered to animals simultaneously with thyrotropic hormone diminishes the exophthalmos. It has also been shown that after the administration of thyrotropic hormone to normal animals for several weeks the incidence of exophthalmos increases considerably Friedgood (8) has shown that this latent exophthalmos develops later when the thyroid of the animal has become refrac

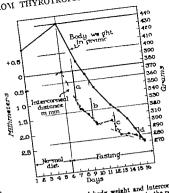


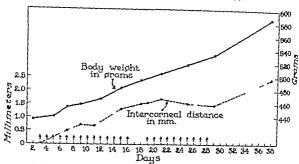
Fig. 4. The changes of body weight and intercorneal distance in a fasted animal. 6, The decrease in the prominence of the eyes coincident with the first 40 gram loss of incident with the eyes coincident with the gram loss of the eyes coincident with the second 40 gram loss of body weight. 6. The decrease in the prominence of the eyes coincident with the third 40 gram loss of body weight. 6. The decrease in the prominence of the eyes coincident with the third 40 gram loss of body weight. 6. The decrease in the gram loss of body weight. 6. The gram loss of body weight. (Compare with Fig. 30 band c.)

tory to the influence of thyrotropic hormone When this phase is reached the basal metabolic rate falls, evidence of thyrotoxicosis disappears and the animal usually gains weight. At this time the prominence of the eyes would be expected to increase.

These experiments reported here which cor relate fluctuation of body weight with changes in the prominence of the eyes contribute to our understanding of some of the differences in interpretation of exophthalmos which have appeared in the literature.

B THE EFFECT OF A PURIFIED THYROTROPIC FACTOR (ARMOUR!) ON THE PROMINENCE OF THE EYES IN QUINEA PIOS

Method This product was administered in o 5 and in 1 cubic centimeter (in one instance 2 c.c.) daily amounts to 8 male guinea pigs. Six of these animals had been thyroidecto-the contract of the contract of



1-1 cc. daily dosage purified thyrotropic factor

Fig. 5. Changes of interconneal distance and body weight in a thyroidectonized guinea pig receiving purified thyrotropic hormone. The increase of intercorneal distance is comparable to the increase caused by thyroidectomy alone, (Compare with Fig. )

mized. One of these had also been orchec tomized. Two others were subtotally thy rodectomized. The administration of this so called purified thyrotropic factor was begun 2 to 4 days after thyrodectomy except for one animal, which began to receive 2 cubic centimeters of the preparation on the 16th post

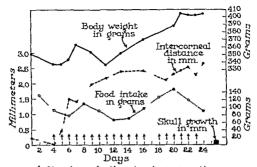
TABLE IL—CHANGES IN THE PROMINENCE OF THE EYES INDUCED BY PURIFIED THYRO-TROPIC HORMONE

Operation	Tre	it <b>mest</b>	Increase of	Chears of bady wants,
	Deys	Ameriat,	(netazer,	
To	11			+43
ī	20	90	90	+72
T	24	<b>0™</b>	<b>JP</b>	+8
T+G*		10	38	+4.5
T	141	po	63	-17
Sale.	36	80	75	+181
Sabt. T	#1	*	-	+45
T		Con.	73	+40

 $\sigma T = thyraidectomy; T + O = thyraidectomy and generalized below. The publical thyraidectomy of the state o$ 

operative day All animals received the product for periods ranging from 7 to 30 days.

Results In contrast to antuitrin T this "purified thyrotropic product in the amount given did not cause a loss of body weight nor did it cause the toxic manifestations previously described Furthermore it did not produce very definite evidence of exophthalmos (Fig. 5) It would appear that the increase of the prominence of the eyes in these animals oc curred in a manner comparable to that see in growing animals which had been thyroidec tomized alone (compare Fig 1 and Fig 5). In view of the weight which was gained, the increase of intercorneal distance certainly is not striking (Table II) Two animals, bow ever obtained an increase which was out of proportion to the changes in body weight Demonstrable differences in the effects due to the different doses administered were not evident for one animal which received a cubic centimeters (containing 10 Rowlands Parket units) daily described no appreciable change in the intercorneal distance, further evidence that this pituitary thyrotropic preparation in the amounts given had relatively little or no exophthalmos-producing effect.



1 20 mg crude thyrotropic preparation

Fig. 6. Changes of interconneal distance, body weight and food communities in a thyraidectomized animal receiving crude putitizaty thyrotropic factor. Thyroidectomy was performed 3 days before administration of the crude thyrotropic preparation was begun. Arrows indicate injection of so milligrams of the product.

C. THE EFFECT OF A CRUDE PITUITARY THYRO-TROPIC PREPARATION<sup>1</sup> ON THE PROMINENCE OF THE EYES IN GUINEA PIGS

Because the 'purfied thyrotropic factor caused hyperplasa of the epithelium of the thyroid but did not induce appreciable exophthalmos, the question arose whether in the process of 'purfication' the product may have lost its exophthalmos-producing quality. Some investigators have suggested the possibility that the anterior pituitary may contain two factors one of which causes exophthalmos and the other thyroid hyperplasa.

A crude thyrotropic preparation was made from the anterior pituitaries of swine in a manner comparable to that employed in preparing the purified thyrotropic factor except for the efforts at purification. This product was reported by the manufacturer to contain some adrenotropic and some gona dotropic principles in very minute quantities.

Method Ten animals were used in this study Six of the 10 animals were thyroidec tomized and 4 were thyroidectomized and

Kin-By prepared by the manufactures for this experiment under the directions of Dr. F. Fenger, and are gred and found to contain a Rowlands-Farkes saits per 4 milligrams of powdered extract. See perceeding foot note for definition of unit. orchectomized Three to 10 days after thy roidectomy daily administration of 20 milli grams of the powdered crude thyrotropic preparation suspended in water was begun After 6 days of this administration the amount was increased to 40 milligrams in half of the animals. This however caused very little if any added effect on the exophthalmos that already had been produced by the smaller amount

Before this crude thyrotropic product was given 2 of the animals received each day for 5 days, I cubic centimeter of the so called purified thyrotropic factor bearing the same lot number as that used in the preceding experiment. Since these injections proved in effective in producing exophthalmos the administration of the crude preparation in the same unit dose was begun. The changes in body weights and in intercorneal distances were observed at frequent intervals as previously described. In addition the consumption of food was carefully determined.

Results On administration of this crude thyrotropic preparation the animals were less lively than normal but there was no profound change in the animals appearance or in their

TABLE III - CHANCES OF INTERCORNEAL DOL TANCE AND RODY WEIGHT OF ALL ANDIALS PECENTRIA THE COURSE TREPORTED ONE DOWN A D A TYON

D <sub>e</sub> Dy done	Operation	Days of treat mount	Change of body waght, gas	Other of carpe- the man, arm	Cor- rected excep- that mate,
	T*		+11	20	26
	7	33	+13	3	3
10 ME	T+at		+10	5	1
	T		+ 1	•	- 00
	T+0	1	-to	<b>P</b>	000
	T		+	-	-
se mg for	7 4 + 1 ut	ӥ	3		
fellowed by to mak	T	ц	+ 14	3 PC\$	1 10
	T+0	•	-8	· ·	••
	716		1		

Thyroldectomy (Thyroldectomy and put (The width of the front

general bears increased 5 mm in each of them a line explains to part the toppens of execu-

activities such as seen in animals receiving antinten T

The food intake paralleled the changes of body weight (Fig 6) Instead of losing weight as did the animals receiving antuitrin T these, for the most part gained slightly Two of the animals receiving the product for a longer time than the other animals gained consider able weight. In these 2 instances, the increase in intercorneal distance was due in part to the growth of the skull, for in these 2 animals the width of the frontal bones between the orbits increased o 5 millimeter 1

The exophthalmos produced by the amounts of this crude product given was not as striking as that produced by antuitrin T although the eve changes were grossly evident (Fig 6 Table III) Previous orchectomy had no apparent inhibitory effect on the exophthalmos.

Although blo-assays, in Rowlands-Parkes units, of the crude and 'purified products indicated that the amounts of thyrold-stim ulating substance given were comparable, yet exophthalmos resulted only in animals which received the crude preparation. The difference in the exophthalmos-producing effect of the 'purified and crude products is further illus-

The portfol of control of shall growth in described absorbane. (6)

trated by the prompt increase in the intercorneal distance of the two animals previously mentioned, which took place when the crude product was given although the animals had must previously failed to remond to the finpfied" product

D. THE EFFECT OF THE SPECIFIC METABOLIC PRINCIPLE? ON THE PROMINERCY OF THE EVES OF CHINEA PIGS

In the two preceding experiments, it was found that a crude product produced both thyroid hyperplana and exophthalmos. On the other hand, a so called numbed under which produced thyroid hyperplana to the same degree failed to induce exophthalmos. The question arises whether in the process of numification an exombthalmos-producing substance may have been lost. This prompted an effort to find a substance which would produce exophthalmos but would not produce thyred hyperplasia.

Billingsley O Donovan and Collin (1) separated a thyrotropic preparation into two fractions. The thyroid-stimulating fraction raised the basal metabolic rate over a period of a number of days by its stimulating effect on the thyroid The other fraction, known as the specific metabolic principle caused an ele vation of the basal metabolic rate within ser eral hours but did not induce hyperplasis of the thyroid.

Since antustrin T induced a loss of body weight and a striking exophthalmos while the other products in the amounts given were less effective in these respects, a study of the exophthalmos-producing effect of the specific metabolic principle was undertaken

Method and results The specific metabolic principle was administered to a thyroder tomized gumes pags. The previously described methods of observation were used. On the 3rd postoperative day the daily administration of 1 cubic centimeter of this product to 1 animals was begun. After a injections had been given and 48 hours had elapsed, there was no definitely demonstrable increase in the intercorneal distance in any of the 3 animals The daily administration was then increased

ct conformed to the specifications described by he di-Time product

to 2 cubic centimeters and the larger amounts also were given to a 4th animal. After 7 to 9 days there was still no evidence of an exoph thalmos producing effect from this product. It was noted that in the 2 animals in which a little more than I millimeter increase of inter corneal distance developed most of this in crease occurred after thyroidectomy and before the administration of the specific metabolic principle Data on this experiment are given SUMMARY

# in Table IV

The exophthalmos-producing effect of sev eral different preparations of thyrotropic hor mone has been studied In addition the effect of the presence or absence of the testes and thyroid on the development of exophthalmos was observed The gradual changes in the prominence of the eyes of gunea pigs have been observed by two improved methods of measurement which were used at frequent intervals

It was found that 25 Junkmann Schoeller units daily of antuitrin T caused toxic man ifestations a loss of weight and a striking degree of exophthalmos in thyroidectomized as well as normal animals. A so called purified thyrotropic preparation given in quantities of 25,50 and 100 Rowlands-Parkes units daily did not produce appreciable exophthal mos nor toxic manifestations in the thyroidec tomized animals but did cause hyperplasia of the epithelium of the thyroid in intact animals. A crude thyrotropic product, given in the same concentration in terms of thyrold stim ulating effect as the "purified preparation produced exophthalmos and slight toxic man isestations in thyroidectomized animals as well as hyperplassa of the epithelium of the thyroid of intact animals.

In many instances the development of exophthalmos was recognizable within 24 hours after the administration of antuitrin T

Because loss of body weight is usually associated with a regression of eyes and because many of the animals receiving antuitrin T lost weight, control observations were made on the regression of the prominence of the eyes of animals that were caused to lose weight by fasting These observations contributed much to the interpretation of changes in the prom

TABLE IV -CHANGES OF BODY WEIGHT AND INTERCORNEAL DISTANCE IN FOUR THIS ROIDECTOMIZED GUINEA PIGS RECEIVING SPECIFIC METABOLIC PRINCIPLE

KOLD	ATETABOLIC	F MARKET	
SPECIFIC	METABOLIC	Observed	Corrected increase of exceptions,
	Change of body weight gm.	exceptibelizes,	exophthamas,
Days of treatment	IN.		1
	+16		1 5
	+11		3
	+45	-	
		1. 41	of lost con

mence of the eyes of animals that lost comparable amounts of body weight because of the effects of some of the thyrotropic products A correction for the loss of weight and con current change in the eyes in thyrotoxic ani mals indicated that the exophthalmos-produc ing quality of thyrotropic hormone was less effective in intact animals than in thyroidec tomized animals. This difference was thought to be due to the superimposed exophthalmosproducing effect of thyroidectomy alone (6) Because the specific metabolic principle

raises the basal metabolic rate but fails to stumulate the thyroid and because it is a frac tion of thyrotropic hormone preparations it was investigated for exophthalmos-producing This principle did not produce qualities. exophthalmos.

Approximately half of each group of an mals that were studied were orchectomized It was found that orchectomy had no inhibitory effect on the exophthalmos produced by thyrotropic hormone.

# REFERENCES

- 1 ARD R. B Arch Ophth, 1940 ns. 24 1167-1178 Idem. Ann. Int. M. 7941 13 564-581 J. BILLEGSLEY L. W. O'DOROVAN D. K. and COLLE
- J B Endocrinology 1935, 24 63-68.
  4. Coult J B Tr A Am. Physicians, 1939, 54

- - 54 48-73 Ophth, 1940 n.s. 24 1176-1177 Idem. Arch. Ophth, 1940 n.s. 24 1176-1177 Idem. J. Clin. Endocr., 1941 : 804-813 Klin. JURNANN KARL, and SCHOOLLER WALTER. Klin.
  - Webr., 1932, 11 1176-1177

    LASEIT, C. G. Med. J. Australia, 1939, 8 519-830 853-869

J. LOED, LEO, and PEREDIAN HILDA. Proc. Soc. Exp.

Biol. 1931 sp. 643-650.

LOCKER ARROLD. Brit. M. J. 1937 i. 76-1877

C. G. (c)

C. G. (c)

so. Idem. Proc. Mayo Clin 959, 14 818-830. I Idem. Tr Am. Ass. Study Cotter on pp. 1

7 Idem Tr Am Am Study Cotter one pr poysion as ROWLANDS, I. W. and PARELS, A. S. Blockers J. 6 MARDE, DAVID T Internat. Coll Surgeons, 1938,

1034, 18 810-841 1 Sent Farker, A. S. Hoor so, Columbia, C. O. ( ).

17 Idem Ann I L M 938, 1 443-453 8 Idem Arch Opbth 940, na. 44 74-1 76. 9 Marine, David, and Roben S. H. Proc. Soc. Esp. 17 Idem Ann I t.M 39. SCHARTER, A. Quoted by Lambie, C. U. ( ).
30. SCHOCKLERY J. A. Proc. Soc. Exp. Biol. 193. 39

J. Idem. Am. J. Anat. 031, 49 370-403. 33 SMILSER, G. K. Proc. Soc. Exp. Biol. 1895, 35

33. Idem. Am J Ophth 1937 so 1189- 203.

34. Ibid. 1938. 1 1308-1 18.
35. Idem. Am. J Path. 939, 15 34 351.
36. Idem. Am. J Ophth. 939, 15 34 351.
37. Idem. Am. J Apath. 939, 181130 1209.
38. Idem. Am. J Apath. 943, 72 140-6.
38. Idem. Am. J Physiol. 50 4, 77 7.

Idem. Am. J Physiol. 104, 204, 105, 106.

MORPHER, GERMARD ARCH. Opinin 1941 143 37-47.
 Shattact Ber Rea. Physiol. 94 043, 137 35.
 PAULSON D L. Proc. Soc. Exp. Biol. 937 35 604

38. Idem Anal, Kec., 1943, 50 4 - 37
59. Idem Am J Flywfol 1943, 140: 903-315.
40 Street, A.W and Scower, E.F. Buchen, J. 915
50 - 905
10 502-906
11 TRADER, A. and RUNKE, H. J. Quoted by Lambie,

# MASSIVE ISLET CELL TUMOR OF THE PANCREAS WITHOUT HYPOGLYCEMIA

SEATON SAILER, M D and M. M ZINNINGER M D F.A C.S., Cincinnati Ohio

FEOPLASMS of the pancreatic islet tissue are usually recognized clini cally by their ability to produce hypoglycemia with vasomotor and central nervous system manifestations. The islet cell tumor need not be of large size to produce symptoms of hyperinsulinism and in deed it is unusual to find one of considerable bulk that falls to exert an appreciable physiclogic effect. The great majority of these tumors are composed histologically of mixed alpha and beta cells or exclusively beta type cells and exhibit distinct secretory granules in their cytoplasms. In most instances the growth is benign A number of questionable and a few undoubted malignant cases have recently been carefully tabulated and dis cussed (1 4)

The case under consideration appears unique in that it concerns a patient harboring a singularly large islet cell pancreatic tumor without clinical or blochemical evidence of hyperinsulinemia. Histological study of the resected tumor showed it to be composed al most exclusively of functionally mactive delta type islet cells Both the unusual microscopic composition and biologic behavior of this neoplasm appear worth recording

A white female 40 years of age was first admitted to the pre-clinic on August 7 1933 complaining of a periodic gnawing sensation in the epigastnum which appeared 1 to 2 hours after eating and radiated posteriorly to her back. These episodes had been present intermittently over a period of 4 years with s) mptomless intervals lasting I to 2 months. The pain was relieved by taking food and aggravated by fatigue Her appetite was usually good apples were recorded as the only food for which she had an idiosyncracy There was no history of hematemesis icterus bloody or tarry stools Investigation of her past history showed that 5 years previously she had had a utenne suspension and appendectomy per

From the Department of Pathology and the Department of Sorrery Colege of Medicine, University of Cincinnati, and to Cincinnati General Hospital, Cincinnati. Major Sailer was lifted in France in November 1944.

formed. Her convalescence was complicated by postoperative pneumonia. There had been no other known illnesses Her husband had died some time previously and was reported to have had acquired central nervous system syphilm. A son by him exhibited interstitial keratuts The patient had not received antiluctic therapy and two blood Wasser mann reactions taken at this time were recorded as

negative
The patient was an obese, white female, weighing
The patient was an obese, white female, weighing
102 5 pounds who presented tenderness to palpation
102 5 pounds who presented tenderness to palpation
102 5 pounds who presented tenderness and over both right lower and in the epigastrium and over both right lower and upper abdominal quadrants. No masses were pal pable Some tenderness was present at the right costovertebral angle at the level of the 11th and 12th dorsal vertebrae A roentgenologic study of the gastroenteric tract August 8 1933 showed the stomach to be of the high transverse type exhibiting hypertonicity and hypermotility No muosal de fects were demonstrable in the stomachor duodenum. Gastric analysis (Ewald test meal) showed a free hydrochloric acid content of 74 degrees and a total acudity of 90 degrees. She was placed on a limited diet with alkall administration which relieved her pain and produced general subjective improvement. She was observed at intervals in the out patient department until 1935 when it became impossible to continue her visits as she now was unable to take leave from her job to attend the clime. She stated that she felt well except when she neglected to take the alkaline powders She was not seen again until April II 1938 when she visited the gastric clinic after an absence of about 3 years She stated that she had been well and free of symptoms until September 1937 when her previous complaints returned and became progressively more severe. She was forced to remain in bed during the month of Febru ary Once during this period she suffered an attack of vomiting which culminated in a severe gastric hemorrhage and she was brought to a hospital and placed under observation for I week. Improvement under treatment was rapid though she continued to complain of a burning sensation in the epigastrium. She was advised to continue on a Sippy diet. Her weight was now 165 pounds. There was moderate tenderness to palpation in the right upper quadrant and pain was elicited over the descending colon. A firm mass having a sharp irregular edge was pal pated below the costal margin in the left upper part of the abdomen. This was tender to pressure and was thought to be the spleen. Roentgenologic study performed on April 18, 1938 and repeated on May 1938 showed the duodenal cap to be definitely deformed and irritable with extremely marked SURGERI GINECOLOGI AND OBSTETRICS

kecalized tenderness present A disenses of scale Security of the security of th JEOGERAL DICCT WES INSIGE A DOOR ASIND TEST PER CONTROL OF THE PER CON formed May 10 1010 was negative. The red blood count count come conditions and the white blood cell the left upper abdoming that the palse blood cell a misnisced kines the national might represent the nation was admitted to the the test upper andominal quaturant migna representations a mispated kildery the patient was admitted to the patient with the patient was admitted to the patient wa a mispaced kinney the patient was admitted to the bogolist of the geniloutinary service. Fat plates of the abdenian and this part in temporal on whomever hospital on the seminournary service that plates of the abdomen and billiars including the processing of the seminournary service. Of the absolute and obtained reference possessing the first and obtained reference possessing the first and the fi duch to fever any rena appearance of the state of the state clinic for further observations of the state of t curcuspen to the Seatile Cities for interest owners a fine 2. On June 2. 1938 a larrow chema showed the masses in the left inner a helendral markets. tion. On June 2 1010 a tarrow enems anower tree to be medial to the left upper absoluted made in the left upper absoluted made in the detection color and quadrant of the left between the left b to be medial to the descending colon and at the level of the lower pole of the left kidney role of the left kidney. The Choice will displace this region. A fratmentiate sense denum from the marking examination in the displacement of the marking examination and the marking examination and the choice will be a sense of the choice will b on July 19 showed no cascular changes in the duo-denium from the previous examination and the contract and improved on the recognized of the denum from the merious examination and the particular second improved on the prescribed electropy. On the principle of having vomited in \$200 returned electric executions of which and of being make to retain passing of asying vomited intermittently during the preceding 5 weeks and of being anable to retain any to the beoptial feeling week. She was admitted your man and of the booptial feeling very weak and containing to the booptial feeling very weak and consistent with the property of the property was a suffer from abdominal pain and receased vomiting. to the pospital recting very wear and continuing to suffer from abdominal pain and repeated resulting The control country and to receive the resulting James from Bacomina jum and treated vomining to head of the white the white the late of the white of the late of The fed Cell Count was 4 170,000 and the white blood cell count 8,500. The mass noted in the left opening and on the left of t Upper government quantum terratures successfully open pairs that and no new light was shed on its nature of the period of the successfully open property will be modified (restraint for patration and no new light was speed on its nature.

She again responded well to medical treatment for One again responden wei to medical interment for doctoral vilor and was discharged as improved as a constant of the constant o orr dopocensi store and was discorred as improved in the continue of the conti y month after auminion and advance to continue of a Spany diet. A return of her over symptoms still a second to be sufficient to the state of the second sec a supply ties. A fermin of per vicer symptom sur-ficiently severe to require hospitalization occurred. action of October 21 1910 Physical expination occurred as executed by accounted from the last despital examination occurred from the last despital examination of the contract was executarly unchanged from the last hospital the presence of a diverticulum of the promise form of the presence of a diverticulum of the promise form of the presence of a diverticulum of the promise form of the presence of a diverticulum of the promise form of the presence of the pr the processes of a diverticities of the ground parties of the decodard with friends and second with friends and second with friends and second with friends. of the section portion of the doorsenors who the fall of the falls and second portions and second portions and second portions and second portions are second portions. Outs) Of the centre that and account portions and account of the centre susception that the mass might be in the panetees A spling field Wassermann and gold curve were constitutional and sold curve were constitutionally and the constitution of the constituti A spinal major wassermann and gold curve were recorded as repartire on December 12 1900. The addition was distincted on January 12 1900. The additional distribution of directiculities of the Opplement with resolution of the Opplement Character Spinal Character

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The reading was 131/83. The red about cell count as 3,760,000 and a white blood cell count 15,700. Fig. 3, 100,000 and a white boost cell count is 700, animation of a stool specimen for occult blood Amunicipal of a since specines for occur occurs of a slightly positive reaction to the subject test. The since of practicaling develoral rate was made to the since of the sin pastire resection was believed to offer the best

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THE PETIORDECL I BE SERVED A GOOD THE SERVED AND LEFT, BUT OF A GOOD THE SERVED AND LEFT FROM A SERVED AND A pe seen and ten, but there was no caller precasal and no stem of artivity. On exploring the left spread abdominal quantum coloring the left spread and coloring t Abdominat questant a cultumerated about noting that a made out in the region of the body and the region of the r man par made out in the retion of the body and that of the pancreas Closer inspection should be be a superior collected most of this organ and to be a collected most of this organ and the collected most of this organ and the collected most of has be applicably replaced from our way was a source of the adherent to the fefanting stomach and spice of the common through t the supercit to the Minum, Honson, and there are comparable differences and comparable differences and the comparable differ it are thin, wer enoughtained fifth that a set and fairly freely morphie. No firstituted could be a set as a se and hally deep movade. As includes one of the mail was expected through the manual was expected through the mail was expected through the financial from and made out the main was closed largest the statement of the carefully directed free and the statement of the s patrocolic ligament carefully directed free limits thought to be occluded by time the limits are secured of the contents and limited. The notice as thought to be occurred by these true in the state support of its contents and braid. The patient sea stripped on the content and update. Are puted than how a season and a shock 12 boars after open than how a season and a season a season and a season a season and a season a season and a season and a season and a season and a season and

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half of the cell diameter. Special stains for cytoplasmic detail, by means of both the Mallory Azan and the Gomori techniques failed to reveal the presence of alpha or beta cell granules. Sections taken from numerous widely separated portions of the tumor showed a strikingly uniform cell type and arrangement resembling the delta cell of pancreatic islet tissue. In most instances the tumor was com posed of broad sheets divided by elongated connective tissue trabeculae of varying thickness (Fig. 3) Some zones were completely walled off into circular nests of round and oval cells. In a rare zone the cells became more columnar resembling duct epithe hum. The cytoplasm of the cells in the larger zones stained light pink with cosin with an occasional one showing a clear zone about the nucleus. All portions of the tumor possessed a rich vascular supply About some capillaries the cells assumed a rosette pattern In a few areas small clumps of cells were found lodged within the lumina of the vascular channels No portion of the tumor showed any striking varia tion in cell size or shape. Mitotic figures were present but not numerous. The thin capsule sur rounding the tumor was invaded by nests of uniform tumor cells at many points and these cells also pene trated adherent tags of adipose tissue. One attached small pencapsular lymph node embedded with the adjacent fat was almost churchy replaced by tumor

On account of the finding at operation of tumor in the lumen of a large vein she was given postoperative deep x ray therapy and received 10,400 roentgen units between Warch 17 and April 25 1941. For several months she complained of some pain in the region of the incision but this gradually disappeared and at her last examination at the clinic on February 20 1941 she was remarkably free of any symptoms. Roentgenologic examination December 17 1941 still showed deformity of the duodenal cap and the presence of a diverticulum of the second portion of the duodenal.

the duodenum



Fig. 2. Portion of tail of pancreas infiltrated by tumor cells bearing a resemblance to islet tissue

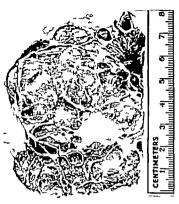


Fig Cross section of original tumor after fixation and staining

The patient was seen again Max 15 1043, by request. She had remained free from any digestive disturbances. Her appetite was good and she had regained her usual weight weighing 210 pounds She said that recently there had been some discom fort in the abdomen to the left of and just above the umbilities. On examination the incision was well healed but an indefinite mass could be felt in about the position occupied by the original tumor. This mass was difficult to outline because of her beestiff but apparently did not desend with resemble the same and the same properties of the same properties of the same properties.



Fig. 3. Broad sheets of uniform appearing cell types composing the bulk of the tumor

printion. The liver was not enlarged and the spicen formation are user no my films of the pastroenteric tract howed the stomach to be of the transferse There was slight deformity of the duodensi bulb The second and third portions of the duodenum outs the section and time portions of the discounting appeared normal. The pulpable mass lay below the stomach but did not displace it. The color was the stomach but did not displace it. The color was homeco but un not urpeace it are coon was negative roentgenologically and its relation to the negative focuserosopically and to relation to the mass we not determined. The lungs and mediantinal mass was not determined a ne innga and mediastinas structures appeared normal. Clinically, it seemed likely that the tumor had recurred. In the absence of any striking symptoms she was unwilling to consider any further studies or explorators operation at this time

In July 1043, the patient convented to enter the hoppital for a glucose tolerance test which was es-sentially normal

	- wolch wa
Fasting t hou	Milligrams per cent
home	
3 hours. 4 hours.	26 6
	•
t I Jear later	83

Mout I car later July 13 1944 she entered the hospital complaining of headache of several the pospital companing of personne of several months duration and womting of 4 weeks. She had attacks of dizeners. She said she had but the companion of the several s about 10 pounds in weight though he still weighed 193 pounds. The liver was found to be moderately 193 penulus are used has some or manufacture enlarged with a nodular edge and a mass on the thingsee with a months cuge and a mass on the left ide about the size of a for was found. I gluonse ter and about the same of a list was found. A greened tolerance test again showed an essentially normal curse as follows

, [
M lligrams per cent
97 57 61
3 95

I blood sugar determination made f om blood taken turing on of her dizzy spells was 83 milligrams per cent

On tugust 1 1014 a laparot my was performed and disclosed a recurrent tumor involving the pancress numerous podules in the liver and several in the merenters and omentum. One nodule about to 3 centimeters in diameter in the omentum wa removed. Microscopic examination bowed an appearance exactly like that of the original tumor

The patient was discharged from the hospital eptember 3 1044 apparenti improved. She had represent 1944 apparent inquiries one incommended attacks of abdominas pain and occasional omiting for a hich she was given fairly large doce of function of opium. On November 0, 1044 she wa uddenl sched by intense epseastre pain and vommeted coffee ground material. She was admitted to the hospital and although it seemed of your that she had had a severe intra-abdominal accelent she was treated by nonoperative mea ures in view of the Loon ten ive malignant disease Continuous

gastric suction and large dover of openies take her Considerable avantomatic relief but the temperature and pulse rose and she died vovember 10, 1044 Justipas was bettermed 3 hours bost modes, to

loyoung peing an apartiset of the lathopate into the low market in the lathopate into the la Various and qualities are (1) messages there are the same results as a consistent on the last results as a consistent of the last results are accounted to the last results are Anatomical magnood were (1) measures a more than with infarction of jefunum and bemorther section (3) recurrent carcinoms of lancers and tools with insurement of kindness and second section of the section of the second section of the section of th arctico (3) recurrent carcinoma or pancres and metastasis to liver, unnan bladder attern and meteorier) (3) disodenti ulter (chroner) attern and

On opening into the periament carrier is to be centimeters of blood tinged fluid was found. It are crustments of 60000 unged mad was found. If was immediately noted that a section of Jenum 50 continuetes in length had a dark purple bard in face. This extent of boxed was very alignify dilter but no constriction volvains or lefectoring and found. The mescutery of this segment of interine was very dark red and antennortem blood clots were demonstrated in the branches of the mercalere artenes and veins. The portal vein was occluded by an old blood clot and apparent tumor mass. The head of the pancress was replaced by a tumor man 13 centimeters in diameter which projected behind

the duodenum and into the lesser curvature of the stomach. The tissue was granular and rained is consistency from mushs to moderately firm. The ta T of the Jancous and replaced by another tire tumor mass measuring 8 centimeters in dameter No normal pancreatic trans a recognizate II splenic vein was surrounded and occurred by tame special year has automated a said occurred or tour Fronth. The regional Jumph nodes appeared normal gives in the segment symposium appeared manner. The large liver registed 2825 grams and find an irregularly roughened external surface due to the projection of nodeles varying in size from 1 to 9 continueters in diameter. These nodules were soft, much and white on the cut surfaces. They are manifesti neoplastic and occupied a considerable proportion of liver rollume. The recognizable liver was dark brown, soft and signify franke. Fan of the portal yatem was occluded by tumor growth

Microscopic examination revealed like cell on choma of the pancrons with massive infiltration of the liver widespread accrotizing conal accross of the liver server hepatitis organizing palethonbophlebutis marked sil cogenic unbitration of last nuclei marked acute passive congestion of hier mesenteric venous thrombens with jejunal infair tion and early gangrene acut me-enteric arterias old spienic infarct chronic interstitul fibross of pancress organizing thrombus of polimonary at renotes mild focal atchecta is and pulmonary re-Phraema

The tymor tis ue obta ned at post mortem lock ! earth like the original tumor and the meta tate nodule removed in August 1914

## BUMMARY

A large tumor of the pancreas was removed from a 48 year old woman who was known to have had a palpable mass in the abdomen for 2 or 3 ) cars but whose symptoms were

those of duodenal ulcer Study of the tumor showed it to be an islet cell tumor of the pancreas. Gross findings at operation and microscopic study indicated that it was malig nant At no time were there any symptoms of hypoglycemia and several glucose tolerance tests were normal Local recurrence and widespread metastases occurred and the pa

tient died 3 years and 10 months after removal of the tumor the immediate cause of death being mesenteric thrombosis

### REFERENCES

- I FRANTE, V KNEILAND Ann Surg 1940 112 161 2 GORORI, G Am J Path., 1930, 15.497 3 GRAY LORRE M Am. J Path., 1942 18:513. 4 MALLORY F B Pathological Technique. Philadelphia W B Saunders Co. 1018.

# THE SURGICAL REPAIR OF THE DEEP BRANCH OF THE RADIAL NERVE

FRANK F ALLBRITTEN Jr M D., First Lieutenant, M C A U.S., Philadelphia, Pennsylvania

THE injuries to the extremities in war result in large numbers of peripheral nerve injuries. In a 12 months pe riod 320 explorations of peripheral nerves have been done at this hospital Of these 232 were operations for nerve injuries in the upper extremities, 51 were explorations of the radial nerve. In 15 instances the radial nerve has been explored distal to its point of division into the deep (motor) and superficial (sensory) branches

The injuries to the deep branch of the radial nerve have been due to penetrating wounds of the forearm extensive soft tissue wounds and fractured bones of the forearm have been the usual associated injuries. The deep (motor) branch of the radial nerve is well protected from pressure contusion and superficial in juries. Its injury is rare in civilian life and the characteristic deformity and function loss are most often seen in the regenerating common radial nerve before the regenerating axones have reached the most distal muscles or those supplied by its deep branch

It has been regarded that the repair of the radial nerve distal to the point of division into the superficial and deep branches is generally not satisfactory This was thought to be due to the small caliber of the radial nerve distal

nuity of the nerve. Mayfield found these un favorable factors in the technique of nerve repair could be overcome and usually a satisfactory repair could be accomplished. There are two especially favorable conditions for regeneration in this particular nerve first, it carries only motor fibers and, second only a short distance must be bridged before the regenerating axones reach their motor end plates Interruption of continuity of the radial nerve distal to the origin of the deep and superficial branches is also distal to the site of

to its point of division and because of the dif

ficulty in obtaining sufficient length to close any appreciable defect existing in the conti-

origin of at least one motor branch to the extensor carpi radialis muscle group. Conse quently extension of the hand at the wrist is not lost, though it is impaired. In the position of extension the hand has a character istic radial deviation due to the loss of function of the extensor carpi ulnaris muscle Associated with this functional deformity at the wrist is the loss of extension of the meta carpophalangeal joints of the fingers and thumb the loss of extension of the distal phalanx of the thumb and abduction of the thumb (Fig. 1)

Such a lesion produces a characteristic deformity as well as serious functional loss

From the Neurosurgical Section, Ashford General Hospital, Whit Sulphur Springs, West Vingunia



Fig. Characteristic deformity associated with deep radial nerve paralysis. Note extension of rat th radial deviation, loss of extension of all metacarpophalangeal joints and loss of abdoction of thumb.

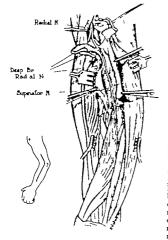


Fig 3.



Fig. Side view of characteristic deformity Loss of abdrection and entersion of themb obstructs entry of objects in grasp of fingers. Loss of extension of fagen reduces the reach of th greap and impairs fine novements

of fragers. Fig. 3. For illustration the extensor carpi radials muscles have been divided transversely and reflected. To deep branch of the radial never spiring potentiorly around the neck of the radius and passes bet een the specials and deep planes of the supinistic bereis muscle. The extensor carps radials bereis and the extensor deployment comments unneces have been separated to expose the branching of the deep radial nerve as it energies from the suphrattor bereis muscle.

Grasping objects is greatly impaired as the dorsum of the thumb impinges on the object. The thumb must first be abducted with the opposite hand in order to encircle the object and oppose the fingers. The fingers cannot be extended to open the hand for grasping the dorsum of the fingers is alid over a fixed object until the finger tips pass over it and it then comes under the flexion function of the fingers The loss of fixation of the metacarpophalangeal joints by the extensor tendons results in loss of fine movements of the fingers. Abduction and adduction of the fingers are impossible unless the metacarpophalangeal joints can be extended (Fig 2) The functional loss resulting from a lesson of this terminal branch is almost as disabling as the loss of the common radial function of the mid arm. Inter ruption of the continuity of the motor branch of the radial nerve distal to its rite of division may result in loss of any one of the functions mentioned depending upon the nerve branch injured (Fig. 3)



Fig. 4. Dissection of radial nerve aboving injury to radial nerve producal to act of division and site of foreign body in the deep branch. The entire area was resected and a satisfactory end-to-end sature accomplished. I Common radial nerve: 2 scar be tween common radial nerve and superficial and deep radial nerves. 3, deep branch of radial nerve. 4 superficial branch of radial nerve.



Fig. 5. Findings at operation of patient shown in Figure 3. There is scarring of the deep branch of the radial at its site of division. The extensor campi radialis and the extensor communis digitorum muvele group have been separated. The ven retractor is bolding back the cut superficial portion of the supmantor the branches labeled show the marches supplied. A branch satising below the supinator muscle to the extensor carpi radialis longus nuncle is commonly demonstrated by electrical stimulation though not generally described in the autonical texts. 1 Deep branch of radial nerve 2 nerve to extensor carp radialis muscle group 3, nerve to extensor carpi radialis brevs in muscle, 5 nerve to extensor carpi radialis brevs in muscle, 5 nerve to extensor carpi radialis brevs in muscle, 5 nerve to extensor carpi radialis brevs in muscle, 5 nerve to extensor carpi radialis brevs in muscle, 5 nerve to extensor carpi radialis brevs in muscle, 5 nerve to extensor carpi radialis brevs in muscle, 5 nerve to extensor carpi radialis brevs in muscle, 5 nerve to extensor carpi radialis brevs in muscle, 5 nerve to extensor carpi radialis brevs in muscle, 5 nerve to extensor carpi radialis brevs in muscle, 5 nerve to extensor carpi radialis brevs in muscle, 5 nerve to extensor carpi radialis brevs in muscle, 6 nerve to abductor pollicis longus and berefi muscles.

The anatomy of the nerve can be described by the surgical approach. An incision is made on the anterolateral aspect of the lower third of the arm lateral to the elbow joint. It is continued on the dorsum of the forearm to the junction of the middle and lower thirds of the forearm in the palpable groove between the extensor carpi radialis muscle group and the extensor digitorum communis muscle. Such an incision passes posterior to the lateral cu

taneous and anterior to the posterior cuta neous nerve of the forearm and does not cross the flexion crease of the elbow It allows the anterior border of brachioradialis muscle in arm and forearm and line of cleavage between extensor communis digitorum and extensor carpi radialis muscles to be easily explored

The cleavage line between brachioradialis and brachialis muscles is then developed and as the brachioradialis muscle is retracted lat



Fig. 6 End-result in Case Note tendons of extensors and abductor of thumb. There is residual a cakness of the extensor of the middle finger

erally the common radial nerve is exposed Branches to the brachioradialis and extensor carpi radialis longus muscles emerge from the lateral side of the nerve The medial aide is safe for dissection

The radial nerve usually divides into the superficial and deep branches at about the level of the ellow joint (Fig. 4). The more medial or superficial branch of the nerve can be traced downward into the foream beneath the brachloradialis muscle. It becomes subcutaneous in the distal third of the forearm. This is a purely sensory nerve and its injury is of minor importance when compared to the injury of its motor division.

The second terminal branch of the radial nerve is ordinarily known as the posterior interoseous branch, the deep branch, or the motor branch. This nerve passes anterior to the capsule of the elbow joint, then continues laterally and posteriorly to curve about the neck of the radius beneath the superficial portion of the supinator muscle. A motor nerve branch to the supinator muscle is usually given off the lateral side of the deep radial nerve a short distance above its passage into the supinator muscle.

To expose the nerve distal to the supinator muscle the dissection is made on the dorsum of the forearm. There is a pulpable groove



Fig. 5. Result in Case 4. Near complete abduction of thumb and extension of the digits has been regained



Fig. 7. Result in Case 3. Note loss of asost prormal portion of substance of extremor muscles from initial &bridement of wound. The residual muscles provide inifactory extension and abduction of the digits following nerve reveneration.

between the extensor carm radialis and the extensor digitorum communis muscles in the middle third of the forearm and dissection will develop this line proximalward along the intermuscular septum from which some of the muscle fibers of both groups of muscles ong When the extensor carpi radials muscles are retracted laterally and the extensor communis digitorum muscle is re tracted medially the deep branch of the radul nerve will be exposed at its point of emergence from the supinator muscle. Medial branches to the extensor communis digitorum and additional lateral branches to the extensor curpi radialis muscles are given off only a short distance from its site of emergence from the



Fig. 9. Extension of wrist and digits obtained by tra don transplantation ben radial perve was irreparable

TABLE I

Dev N	Dat	I jury I relation t suprnator muscle	Defect i	Operati procedure	Result
	6-20-44	Datal	4	Repai	Return of function Fig 6
	7-10-41	Distal	3	Unsethfactory repai	Lost t follow-up
,	9-1 44	Distal		Repai	Return of function Fig. 7
4	0-10-11	Proximal	4.5	Repai	Return of function Fig. 8
5	0- 1-44	Distal		Veurolysis	Last t follow-up
6	2-15 45	Provincel and within		Irreparable	Tendou transplant
7	3-35-45	71 this and destal	8	Irreparable	Teadon transplant
8	3- 3-45	With and distal	9	Îrreparable	Tendon transplant
•	4- 2-45	Within	4	Repai	Too recent for evaluation
	4 215	Prenimal	7	Repair	Too recent for evaluation
	4- 5 45	Dista)		Neurolysia	Too recent for evaluation
	4- 6-45	Prochesi	7	Repair	Too recent for evaluation
3	4 0-45	Distal		Venrolynia	Ret in of function
4	4-18-45	Distal	4	Repai	Too recent for evaluation
٠,	4- 1-45	Within	4	Repai	Too recent for evaluation

supinator muscle. The nerve then becomes much smaller in caliber and may give off additional medial and lateral branches but the main trunk continues distalward to reach the extensor pollicis longus and brevis and the abductor pollicis longus muscles. These are terminal branches of the nerve (Fig. 5)

In the surgical exposure of the deep branch it will probably be necessary to incise the superficial portion of the supinator muscle in order to obtain complete visualization and gain length to obtain an approximation if a segment of the nerve has been destroyed Transplanting the nerve superficial to the supinator and elevation of the common radial to a more superficial position beneath the brachioradialis and flexion of the elbow with the nerve transplanted more superficially per mits large gaps to be sutured without tension An accurate approximation of only the epi neural sheath with fine suture material with out tension is the essential requisite for nerve suture The minimum of foreign body and trauma at the line of suture insures minimal inflammatory reaction and fibrosis. If the nerve is injured at the site of its branching the distal filaments should be approximated by fine sutures through the sheath in order to form a single distal trunk. A more satisfactors end to-end suture can be obtained in this way than in trying to suture each branch to the single proximal trunk. Following su ture of the nerve the elbow is immobilized in a position of flexion for a period of 4 weeks and then gradual extension is permitted to take place.

To close a defect by stretching the nerve either at the time of operation or postopera tively results only in fibrosis of the stretched section and prevention of regeneration. It will be impossible to repair some defects even after an extensive mobilization and transplantation of the nerve to a more superficial position. In these patients tendon transplant will have to be resorted to The defects in the deep radial nerve in this group of patients are listed in Table I In the 15 patients in which the deep radial nerve was explored at has been possible to obtain a satisfactory end to-end suture in 8 In 3 of these sufficient time has elapsed to expect regeneration and all 3 have shown excellent return of function (Figs. 6 7 and 8) Four have been regarded as technically irreparable due to extensive loss of nerve tissue. Of these 3 have been referred to the orthopedic section for tendon transplants (Fig o) A neurolysis has been done in 3 patients In these continuity of the nerve was intact Two of this group have had return of nerve function since the neurolysis was done

#### SUMMARY

The results to date in 15 cases of exploration of the deep or motor branch of the radial nerve are given

The deep or motor branch of the radial nerve should regenerate well because of its purely motor character and the short distance regenerating axones must span before reach

ing their motor end plates.

The characteristic deformity and function loss is described and the surgical anatomy discussed. By sufficient mobilization and transplantation of the nerve moderate defects in the continuity of the nerve may be closed and satisfactory repair may be accomplished.

The early results have been sufficiently good to warrant exploration of injuries to the terminal motor portion of the redial nerve with an attempt to restore its continuity. If destruction of the nerve is of such extent that repair is impossible tendon transplant to obtain extension of the digits and abduction of the thumb should be done

Additional data have been obtained since this paper as submitted to publication. Tenty four reportures of th deep branch of the radial nerv has brea done? I forstance, as fasted? Table? If the nerve as impossible Sat re of the nerve was required to 3 patients. Of the Sat re of the nerve was required to 3 patients. Of the part above, the return of function a sare above for present of the part of the part of the part of the part of the reporteration. Lyst and have also so no relates of reporteration. Lyst and the large shape of the patients.

### REFERENCES

ABSOTT, L. C. J. Nerv. Ment. Dis., 011, 00 456-474 2 GRANT J. C. B. A. Method of Anatomy Baltimore William Wood & Co., 1037

 HAYMAKER, W. and WOODERLE, B. Peripheral Ver-Inj. ries. Phaladelphia. W. B. Saunders Co. 043 4. HIGHER, W. B. and SAUNDER, F. K. Brit. J. Sarg.

5 Koca, S. L. Ball Vorthwest Uni M School, 41,

 MARBLE, H. C. HAMLIN E., JR. and W. TANA, A. L. Am. J. Surg., 1942, 55 174 194.
 MAYPIKID, FRANK H. Personal communication.

 MAYTELD, FRANK H. Personal communication.
 Nerve Injuries Committee, Medical Research Council. Aids to Investigations of Peripheral Nerve Injuries.
 M.R. C. War Memorandum No. 7 London, Halleng Online of Committee Control Con

M. K. L. War zermoransum vo. 3
Majeuty Stationery Ofoce, 943
O. POLLOCK L. J. and D. Wis, L. Peripheral Ven. Injuries, New York, Paul B. Horber Jac. 93,
O. Subcommittee on Neurosurgery. Division of Medical
Sciences of National Research Council. According
gry and Thorack Surgery. Philadelphia. W. B.
Saundern Co. 943

### THE TREATMENT OF BURNS

## Report of 155 Cases

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HIS series of burns includes 155 pa tients admitted and treated during a year. There were 97 admitted from forward hospitals where the primary dressing was done and 58 admitted directly from the scene of accident with first aid but without initial definitive care. Twenty six cases or 17 per cent of the entire series, were third degree burns the percentage being about

the same in the two groups.

This discussion will concern itself almost entirely with the treatment of third degree burns with a description of the methods used and with emphasis on strict adherence to established surgical principles. Not much attention has been paid to the type of emol lient used for primary dressings because throughout the series it has been observed that other factors seemed more important In the group of patients admitted from for ward hospitals, a wide variety of materials was used in the group admitted here directly from the scene of accident, all were treated identically and the results were similar in the two groups. It was felt, therefore, that factors other than the emollient were the ones to consider as important. Gradually throughout the series, an attempt was made to improve technique and shorten the time required to get complete skin coverage. By the end of the senes, we were accomplishing our aim of obtaining complete skin coverage of third degree burns within 4 weeks of the date of injury

#### CLASSIFICATION

Before discussing treatment it is important to establish the method by which a first, second or third degree burn was diagnosed When erythema only was noted the diagnosis was first degree. When erythema plus blisters appeared the tissue under the blister was in spected as well as could be done without dis-

From a hospital in the Communications Zone.

turbing the blister. When the base of the blis ter revealed the dermis to be pink and covered with a network of fine blood vessels appearing as multiple red dots a diagnosis of second de gree burn was made However, when the dermis under the blister was sallow in appear ance or there were only a few visible vessels a diagnosis of third degree burn was made. Nat urally if the destruction went beyond the blis ter stage to charring the diagnosis was obviously third degree In all patients admitted from forward hospitals, the diagnosis made at the forward hospital was accepted and record ed In only 1 instance was 1t necessary to change the diagnosis, this injury being a phosphorus burn which was originally called second degree but which eventually required grafting of skin Certainly infection in the management of these patients did not make third degree burn wounds out of those that should have healed without operative repair

### INITIAL TREATMENT

All cases of the two groups had the following treatment (1) prompt attention (2) plasma 50 cubic centimeters for each 1 per cent of body surface burned given during the first 24 hours (3) morphine for comfort (4) thick pressure dressing with fine mesh gauze next to the burn over a nonirritating emollient (5) immobilization by the use of pressure dressings with stockinette or clastic pressure (6) warmth and rest (7) no change of primary dressing for 7 to 10 days.

All patients from forward installations arrived here in about 4 to 6 days in excellent condition taking a full diet. In a few the dressings needed to be reinforced because of shifting in transportation but most of them required no immediate care

All of the 58 patients admitted directly to the hospital from the scene of the accident had identical care. They were taken from receiving to the operating room where all the personnel were required to wear masks and where sterile technique was followed None of them was anesthetized none was débrided. Blisters were not disturbed. When mud or dut from the street had soiled the burned surface it was washed gently with a warm mild soap solution. When no obvious surface contamination was present, no cleansing was done Some were brought in with a thin dressing over the wound a few had had a topical appli cation of an ointment. These dressings were removed but no effort was made to remove any medication. Morphine in the meantime was given to those who had none before ad mission and plasma was started at once by the operating room personnel As rapidly as possible sulfadiazine cream in fine mesh gauze strips which is kept available for that purpose. was laid smoothly over the burned surface. Gauze pads, followed by full thickness cellucotton absorbent pads were applied then sheet wadding and plaster of pans for extremities. in order to get maximum immobilization. A section of stockmette was used over the heavy pads for the face and head with holes cut for eves, nose and mouth. Over the trunk the padding was supported by ace bandage

Even in the extensive burns, the dressing was completed by the time r unit of plasms had been given, so the patient, having been kept warm in the meantime, was taken to the ward and put to bed. A note indicating how much plasma he was to receive accompanied the patient to his ward. This amount was calculated rapidly on the basis of 1 unit for each 5 per cent of body surface and usually the entire amount was given promptly without interruption in order to prevent hemoconcentration and shock. Warm drmks, rest and quiet were the rule for these patients and usually in a few hours they were ready to eat Even though many patients had severe burns none developed shock, probably because of the prompt administration of a calculated amount of plasma. Within the first 24 hours copper sulfate determinations were done to evaluate the hemoconcentration Plasma or whole blood was given as indicated. On the seriously or extensively burned patient, this checkup was repeated frequently during his entire stay in the hospital and blood or plasma supplied whenever indicated. After the initial amount had been given, very few patients required additional plasma. Whole blood, however was used in the later treatment of a patients and will be discussed later.

Of the 129 first and second degree burns, all returned to duty. They had an average of 5 per cent body surface burned and were in the hospital an average of 28 days. No complications developed in this group and now required transfusions. All were treated by initial pressure dressings. Some received chemotherapy others did not, and since the results were good gradually less attention was given to chemotherapy in the first and second degree burns. This subject will be discussed in more detail under a separate besiding

# LATER TREATMENT

In the first and second decree burns, dresings were changed at approximately 8 to 10 days. These patients were without exception taken to the operating room where sterle technique was the rule. All were premedicated with morphine and stropine, and sodium pentothal anesthesia was used whenever the change of dressing was painful. In approximately half of these cases no subsequent dresing was required. When required areas were cleansed with warm saline sponge fine mesh gauze strips, dry or impregnated with sulls diazine cream, were laid smoothly over the burned surface and were covered again by padding and pressure immobilization exactly as at the initial dressing Dressings were changed in the operating room at about weekly intervals until recovery

In a few cases there was some evidence of erudate and infection but no cultures wer made. This infection cleared rapidly and m no instance did it become a cause for a charge in the management of the first and second degree burns. All of these solders returned to duty in this theater of operations.

The third degree butus cannot be damised as simply and it is with these patients that we were most concerned. Their management required the utmost patience and persistene and after the initial few days had elsyed their treatment was simed at prevention of infec tion coverage by skin grafting and supportive measures. It was our observation that the longer skin coverage is delayed, the greater is the problem of infection and supportive ther apy. Also the greater the infection the more difficult the skin coverage. It thus became a race between the surgeon with his skin grafts and the wound with its bacteria.

In this series there were 26 patients with third degree burns, with an average of 20 per cent of body surface involved, all of whom required skin grafts. Two distinct types of pathology were noted in these wounds. Those who had damage but not destruction of the full thickness of skin usually had a gradual slough of dermis down to the subcutaneous tissue during the first 2 weeks. Under this slough then appeared the granulating surface. Usually the sloughing was not complete at the first dressing so the patient was redressed and returned to the operating room in about 4 days. Usually by this time 2 weeks after the burn skin replacement was started

The other type of third degree burn en countered was that in which the entire thick ness of akm had been destroyed. By 14 to 21 days the entire area was well demarcated It has been our experience that it is best not to wait for this eschar to loosen and it is a decided mistake to leave it intact until fluid collects under it. As soon as the area of demarcation became evident, the entire eschar was removed by sharp dissection procedure was usually carried out about 2 weeks after the burn Very httle bleeding was encountered and secondary hemorrhage was controlled by pressure dressings. In a few days the area was covered by granulation tissue and grafting was started

On several of our recent patients we have placed very thin grafts directly on the subcutaneous fat at the time of removal of the destroyed skin without waiting for granula tions to form and we have been graffied to see that about 90 per cent of these grafts were successful. In the future we expect to start grafting promptly after removal of the eschar because from the standpoint of infection the area is as clean as it ever will be

It has been our experience that from the time the damaged or destroyed skin is re moved skin replacement must be pushed vigorously until the entire area is covered Naturally in extensive burns it is impossible in most instances to do a complete coverage at one operation The length of the period of anesthesia and the availability of donor sites limit the amount of work that can be done No other factor, however, should be permitted to delay the procedure. In some of our early cases we delayed because it was felt that the area was in no condition to receive skin Always this was later regretted. It is diffi cult to improve an area and the probability of its becoming worse is very real. In a num ber of instances in which we have grafted areas that were thought to be poor recipient sites we have lost the grafts but almost al ways the area improved sufficiently by the skin dressing so that the next attempt was successful. Skin dressing has been our most successful agent in combating infection with its complications. One of our recent patients with 35 per cent body surface involved had the eschar dissected and removed on the 14th and 18th day after being burned. The grafts were applied the 18th, 22d and 27th day and the area was completely covered at that time. He may require a few minor plastic procedures in the future but certainly he has been saved months of disability by prompt and vigorous application of skin

# SKIN GRAPTING

The procedure of skin grafting in the treat ment of burns is not the problem of a plastic surgeon. The primary purpose of transplant ing skin is to facilitate rapid wound healing in order to preserve the deeper structures involved and maintain the general condition of the patient. Whatever procedures might be necessary later to improve the skin function of the grafted area was not given too much consideration at the time of the original graft ing Whenever possible thicker and larger grafts were placed in the axilla poplitical space, and other areas where danger of cicatricial contracture is present, but always the type of graft that was most certain to grow was used The healing of the wound and preservation of the muscles vessels tendons and joints were the primary considerations. Then li the individual could be cured of his burn remain in good general condition with no loss of function of deeper structures, and be completely covered by good skin instead of tender adherent contracting scars we felt that the treatment of the burn had been adequate. Whatever later skin substitution is necessary becomes a problem for the plastic surgeon but originally skin coverage was done to save the patient, prevent sepais and preserve function. Speed of coverage was the watchword and small thin grafts lent them selves better to this type of surgery than larger and thicker sections.

# TECHNIQUE

In an effort to get skin coverage in the abortest possible time we have tried several methods of grafting Because of the pressure of work in this theater of operations and since burns seemed to occur when casualties were heaviest, their care coincided with the care of many other injuries. Also with occa sional change of personnel simplification of technique was necessary.

At first we followed the accepted technique of cutting grafts and placing them in saline as they were removed. After all the grafts were cut, they were spread on a moist rubber dam and transferred to the recipient site. This procedure involved unfolding and smoothing out curled edges, as the graft slipped to and fro on the recipient site and possibly suturing the graft in place. This method was so time consuming and irksome that it was finally discarded.

Next we tried a method which as far as we have been able to determine has not been advocated probably because of the possibility of infecting the donor site. This method is the immediate direct transfer of skin from the donor to the recipient site without passing through saline. We were surprised and pleased with the result. First, it reduces the time required to cover a given area to about one-fourth of the time needed when the section is passed through saline solution and permitted to contract and curl up. Second the adhesive quality of the freshly cut surface causes it to neatle and cling to its new bed chenaciously that in a matter of minutes it is

almost impossible to disturb it. Sutures are never necessary

By the direct transfer particularly of small easily handled sections the cutting instrument carries the graft to its new site, and a forcess or any available instrument fixes one end of the section The knife, as it is pulled away smooths the graft over its new home. Even the under sides of suspended extremities can be grafted easily Graft after graft is laid end to end and side by side, going to and from the donor site so that an entire extremity can be covered in the time ordinarily required to cover the anterior aspect of a leg. The proce dure is done easily rapidly without annow ance the grafts adhere well, grow readily and skin grafting becomes a pleasure. No infection of donor site has occurred

In recent years, much has been written or the application of adhesive substances to the grafts or recupent site. We have had no er perience with the acacia preparation or plasm thrombin or with any other adhesive stance, but believe its use is sound. However, by the immediate direct transfer without washing in saline, we have preserved naturely own adhesive substance to fix the graft to its new location without the use of added adherent.

After the grafts were placed fine medigation mosts but not wet, was laid evenly over the area. Gauze pads and abdominal pads for gentle pressure were applied Plaster of Park casts were put on extremities are bandar, was used over the trunk, with figure-ol-8 for the head and face. Donor sites were spinkled with sulfamilianded crystals and covered in the same manner as was the grafted area. Four to 6 days later the patient was brought back to the operating room for subsequent grafting of sidilitional areas or a patch here and there where a small are falled to obtain coverage.

Most of our grafts were cut very him, the average thickness of grafts being less than or on onch. In our experience generally speaking the thinner the graft, the better it will grow. Also the recovery of the donor site was much more rapid when this sections were used. This factor was important in the 11 cases in the series of patients who had over

25 per cent of body surface involved In these cases it was sometimes necessary to use some of the donor sites more than once. It has been our observation however that skin cut from a previously used site does not grow as well therefore we used a fresh site whenever possible. Most of the donor sites were healed sufficiently to go without dressing in 8 days

# INSTRUMENTS

In an active theater of operations where the patient load at times may become tremendous the problem of keeping instruments available and in working condition is a very real one With a large number of burns requiring grafts and several surgeons at work every instru ment that was available adaptable to skin grafting and sharp was pressed into service When the donor sites were adequate the Padgett dermatome available and blades sharp, the dermatome was used However since sections cut with the dermatome did not lend themselves easily to direct transfer the Blair knife or a Gillette type razor blade was used more often and the dermatome used only for the coverage of special areas such as axilla or popliteal space. The razor blade grasped by a curved Kelly forceps, was the ideal in strument when small sections were desired or only a spot here and there needed to be covered It can be used well by anyone Those of our group who had never done skin grafting became experts in one easy lesson By grasping the blade with a curved forceps, held in the right hand while the left hand steadles the field a strip of skin an inch wide and as long as the donor site will permit can be cut rapidly and easily without assistance. This method lends itself well to the direct transfer of grafts. It has the added advantage of always being available and sharp A supply of razor blades was kept in sterilizing solution so that the decision of whether or not to graft was never influenced by the availability of sharp in struments.

With rapidly healing donor sites availabil ity of sharp instruments, and simplicity of method our group rapidly assumed the att tude that skin is expendable and grafts were placed whenever and wherever possible. In fact some grafts were placed on recipient sites

that looked impossible frequently with very gratifying results For example, an area from which a charred eschar was dissected 10 days after being burned had akin placed over a layer of subcutaneous fat that from all appearances was blessed with only a very meager blood supply Four days later when the dressings were removed the skin was growing nicely and continued to do well Areas with granulations so exuberant and vascular that they could not be trimmed down because of bleeding were covered satisfactorily Areas with soupy exudate were covered by thin sections which grew In general, our aim was to get skin coverage at the earliest possible moment, and the more vigorously this policy was pursued the better were our results both in patient comfort and ultimate function of extremities

# CHEMOTHERAPY

Chemotherapy usually varied directly with the extent and degree of the burn With first and second degree burns, very little drug of any type was used. Recently these patients have received none and are apparently doing as well as those who received sulfonamides. In the third degree burns nearly all were given either a sulfonamide or penicilin. In the early cases when supplies of penicillin were limited sulfadiazine, 4 to 6 grams daily was given with frequent checks of blood level Those patients who showed evidence of sensis were put on penicillin 25 000 units every 3 hours. Usually this was continued for about to days while skin grafting in stages was continued One soldier with over 40 per cent of body surface involved had penicillin for to days, 200 000 units daily while skin grafting proceeded At present we are using penicillin therapy in all extensive third degree burns.

Locally sulfadiazine cream in fine mesh gauze was used as the initial dressing and was continued on subsequent dressings until it was established whether the burned skin was being saved or lost. On donor sites we sprinkled sulfanilarnide crystals and covered these with fine mesh gauze and pressure dressings plus immobilization just as for the burned areas.

A stimulating dose of tetanus toxoid was given to all shortly after the injury

# SF151S

If and when infection developed in the open wound of a third degree burn the problem was a real one. Particularly was this true in the summer when flies abound. Some patients during transportation could not be adequately protected from flies and at the removal of the initial dressing, it was not uncommon to en counter maggots. Once hospitalized at a fixed hospital where the treatment could be carried on without interruption, adequate fly control rigid use of nets sprays and screening when available soon reduced the flies.

The infection of Bacillus pyocyaneus with its bluish exudate was frequently present. When the exudate was not profuse it was disregarded and grafting continued. When profuse openings were put into the cast and o 5 per cent acetic acid in small quantities was used to moisten the dressings once daily with

good results.

With mild infections of other invaders sulfatiliamide was sprinkled over the wound and sulfadizance given by mouth. In our recent cases, however we have used only perioding 25 000 units every 3 hours continuously at the first sign of fever or purulent exudate. Meanwhile skin strafficie continued.

When the subcutaneous tissue became in volved phlegmonous, and swollen wet dressings of most, warm bone acid solution were used. Pressure dressings as before were used except that muslin or ace bandage was used for a cover instead of plaster of Paris. Skin grafts under this treatment did not take as well but were continued because the results were still better than 50 per cent successful.

Tub baths were not available

Sulfadazine cream strips were not used in the presence of exudate from infection be cause it was felt that a nongreasy dressing would better absorb the material. Neither was this considered a good dressing over freshly laid grafts because of the possibility of causing the sections to slip

# BLOOD REPLACEMENT

None of the patients with first and second degree burns required transfusions. All had plasma, 1 unit for each 5 per cent of body surface involved. Nine of the 6 patients with third degree burns required transfusions and a few required additional plasma. In general, it can be stated that patients with extensive burns will require blood. Four of our patients required 8 units (500 c.c. each) of blood. Three of these todden had 30 per cent body surface involved and the fourth had 40 per cent involvement. However one man with 35 per cent body surface in volved required only 1 unit. One solder with only 10 per cent body surface involved required 2 transfusions but he had considerable infection of a burned forearm. The other soldier certified blood received 1 unit.

Two patients required transitusous because of secondary bleeding after dissecting off or tensive exchar Areas from which the charred skin is removed bleed very little so adequate precaution was not taken to prevent secondary bleeding. Mild pressure controlled the bleeding in both instances and the blood loss was promptly, corrected by transituson.

# ANESTRESIA

In none of our patients was anesthesia used at the initial dressing. No débridement was done Gentle cleanaing of débrid or street dirt was accomplished rapsilly and almost patients! whenever indicated. Coverage by sulfidiarine strips was done rapidly and the patient became comfortable with morphism, purcetion of burned surface and immobilization.

However all subsequent dressings were customarily done under pentothal sodium anesthesia. In patients who had only a small area of first and second degree burn, dreading were usually started without anesthesia and usually tolerated well. If much discomfort was experienced anesthesia was promptly used All patients were premedicated before being taken to the operating room for change of dressing Usually the period of anestheir was limited to I hour but a few were kept anesthetized for 11/2 hours during grafting procedures Usually patients anesthetized by pentothal sodium early in the day were hungry for lunch by noon, and always by evening they were ready for a full diet. This diet was important in individuals who were being grafted in stages, every fourth day Pentothal sodium has been our most satisfactory and

thetic and was used in over 95 per cent of patients. No patient received over 2 grams at

each period of anesthesia

Three patients had gas oxygen ether anesthese on one or two occasions when it was planned to do a long extensive grafting procedure with a surgeons at work. These periods of anesthesia lasted longer than oo minutes there were no complications, yet recovery of appetite and vigor was slow Usually several days elansed before the nationt would take a full diet. Whether this was due to the anesthesia or the extent of the grafts might be questioned, but on several occasions we have done extensive grafting under pentothal sodi um without ill effects. We have felt therefore that for this purpose the intravenous pentothal sodium is the outstanding agent because of lack of delay in inducing anesthesia and the rapidity of recovery of the patient to accept a full diet postoperatively. We used it liberally so that no soldier need dread either the change of dressings or operative procedures

On several occasions when recipient sites have been small we have used local novocaun infiltration for the donor site but usually there were a few granulations on the recipient site to be trimmed down and some discomfort was experienced. As a result we have used local anesthesia only infrequently and only when a few small grafts have been needed.

# EXERCISE

The problem of exercise or passive motion is very important in the treatment of third degree burns. In all of our first and second degree burns, bandages were removed and active motion started early enough to prevent any loss of function. Hand and finger motion in second degree burns was encouraged early Splitting of hands was always with fingers in moderate flexion and thumb opposed. As much of the fingers as possible was left exposed and motion encouraged. When fingers were in volved, either active or passive motion was used during the change of dressing.

In the third degree burns, passive motion of all joints in the involved area was exercised during the change of the dressings. Under anesthesia this was not difficult. Casts of extremities were put on with the knee in mild flexon elbow in 90 degrees flexion forearm in neutral position and hand and wrist in position of function with exercise at each dressing or operation

# GENERAL NURSING CARE

The nursing problem on the wards in the present method of treatment is much different from what it was when dressings were done on the wards. All dressings, without exception were done in the operating room under strict asentic technique. Therefore, the patient ar nyed on the ward as a package not to be opened When hands were involved these patients required feeding. Frequent change of position, when possible was encouraged Backrubs bathing of uninvolved areas and general hygienic care are important to these natients. Exercise of burned hands at the earliest possible moment was constantly en couraged by the ward personnel. Plasma and blood as needed were given on the wards Rigid fly control during the summer season was supervised by the nursing staff. All in all the nursing care of the wards was no more a problem with the burn patients than for an equal number of less severe battle casualties

Most of our patients never had an oppor tunity to see their own wounds or those of the other burned patients until the wounds were completely healed or covered by grafting. They were kept comfortable and their morale was good due to the excellent attention of our nursing staff. Numerous letters received from those who have returned to the United States testify to the high regard for the nurses and ward attendants.

In the operating room the change of dressings was done with the usual personnel Dressings were usually saturated with saline after the removal of casts the patient was anesthetized and removal of dressings was continued painlessly and easily None of the patients dreaded going to the operating room—in fact they felt neglected if their procedure was postponed a day longer than usual

# END-RESULTS

There were 2 cases out of the 23 patients with third degree burns of the hands who developed moderate stiffness of the fingers

Both of these patients were treated early in this series when apparently not enough atten tion was given to exercise. Both were returned to the United States one required a plastic procedure and remained in the service. The other reported to us recently that he was separated from the service because of partial disability of the left hand. He secured a job in a war plant and in a letter dated approximately 10 months after his injury he stated that he had recovered almost full use of his hand and was improving. At the present time all of our patients with hands involved are watched carefully and constantly encour aged to preserve hand function. There has been no more than a mild limitation of motion at any of the other joints, all of which should return to full function promptly with the exception of the 2 cases mentioned with hand disabilities, all the remaining pa tients who returned to the United States went because large areas of newly replaced skin could not be expected to function well in the wearing of military equipment or stand the rigors of reconditioning and the trauma of combat. As far as we are able to learn, only the one patient has been separated from serv ice. There were no fatalities.

# SUMMARY

In this series of 155 cases no attempt was made to keep a complete record of events for later evaluation there was neither time nor facility for research. No control group was used—rather as changes in their management were made the previously treated patients became the control group. By the end of this series we concluded that no change need be made in accepted surgical puniciples. Constant improvement of method and simplification of technique should however be the aim of the doctor who is treating burns.

The treatment of burns lies in the application of surgical principles to the wounds and the wounded. The wounded patient requires comfort, warmth, rest, and supportive therapy. The wound requires deanliness to

prevent sepsis, gentleness to prevent further trauma, coverage to prevent infection and allay irritation, support and pressure for comfort and to prevent fluid loss, immobilization for comfort and lastly and most important closure of the wound by skin in the shortest possible time to preserve the function of the deeper structures and prevent all the complications that occur in open wounds. The method used to accomplish these requirements is not too important, but any improvement of method that will hasten the accomplishment of recovery and avoid complications is a step forward. We have attempted to improve the method without evading the principle involved

principle involved. The treatment of this series of 155 burn represents the work of a group of individual trained not as experts in the treatment of burns, but a personnel trained in the fundamental principles of management of womand wounded soldiers. The results have been gratifying and the following conclusions seem to be indicated

# CONCLUMIONS

 Prompt, clean pressure dresding with immobilization is important in the treatment of huma.

2 Prompt administration of a calculated amount of plasma aids in the prevention of shock

3 Infrequent dressing of burn wounds under strict aseptic conditions will help prevent infection

4 Rapid skin replacement is the best method of preventing infection, deformity and dysfunction in the presence of third degree burns.

5 Grafts transferred directly to recipient sites adhere well and donor sites do not become infected by working directly between donor and recipient sites.

6 Grafts placed immediately after removal

of a charred eschar will grow well.

7 The use of passive motion under and thesia will belp prevent deformity

# ELECTROLYTIC ABSORPTION OF BONE DUE TO THE USE OF STAINLESS STEELS OF DIFFFRENT COMPOSITION FOR INTERNAL FIXATION

# I ALBERT KEY M.D. F.A.C.S., St. Louis Missouri

N 1941 from a comparative study of stainless steel and vitallium (key) it was concluded that 18-8 stainless steel and 18-8 S-MO or enduro stainless steel are practically mert in the tissues and are suitable for the internal fixation of bone

It was further noted that the stainless steels mentioned exhibited a slight tendency to corrosion and that some other stainless steel nails which I had used in the past had exhibited considerable localized pitting and one Smith-Peterson nail had corroded into two pieces after over 5 years but had caused no symptoms.

It was found that the vitallium nails and nlates introduced by Venable and Stuck (4) exhibited even less tendency to corrosion or electrolysis in the tissues and in the solutions used in the experiments than did the stainless steels. But it was believed that the stainless steel possessed certain mechanical advantages which rendered it a more generally useful material for the internal fixation of bone than vitallium. It was stated that the Fracture Committee of the American College of Surgeons should recommend the standardization of 18-8 S-MO or enduro stainless steel for the manufacture of prostheses for the internal fixation of bone and should require such prostheses to be properly labeled in order that surgeons may know what type of stainless steel they are using. The prostheses should be passivated by the manufacturer

The introduction of noncorrosive metals into surgery has led to a considerable increase in the use of internal fixation in bone and joint surgery and a number of new prostheses have been devised. Among those which I have found useful is the Neufeld nail (2). This is a two flanged nail which is bent to form an angle

From the Department of Surgery of the Washington Luiensty School of Medicine, St. Louis, Missouri.

of about 135 degrees and continued downward as a slightly curved plate. It is useful in the treatment of trochanteric and subtrochanteric fractures of the femur. The two flanged nails driven into the proximal fragment and the plate is fixed to the distal fragment with three self tapping screws.

The appropriate screws are supplied with the plate and presumably they are of the same type of stanless steel as the plate. In order that corrosion with the attendant absorption of bone from electrolysis and consequent loosening of the screws and plate may not occur they must be of the same type of steel Unfortunately this is not always true as is shown by the femora illustrated in Figures 1, and 3. Under twilight and local anesthesia these fractures of the femur 2 trochanteric and 1 subtrochanteric were reduced by traction and internal rotation on a Bell table and under x ray control the fragments were fixed with Neufeld nails.

The convalescences of the patients whose hips are shown in Figures 1 and 2 were un eventful except that the resorption of bone around the screws and under the plate was so marked that full weight bearing was not per mitted until the Neufeld nails and screws had been removed the cavities in the bones had partially filled in and the bone increased in density to a point where it was believed that unrestricted weight bearing could be practiced with safety. The patient whose hip is illustrated in Figure 2 complained of persistent pain and disability until the nail was removed It is also my opinion that union of the frag ments which was necessary before it was ad visable to remove the nails was delayed in all 3 instances. Repeated x rays films of all 3 femora showed progressive absorption of bone around the prostheses, and as this fact was attributed to electrolysis it is believed that



nail. First operation June 20, 044. \ \text{ ne months after operation not marked kettrolytic absorption around the distal acres and benests the plate of the nail. On the right, the same hip is abox 13/1 months after removal of the nail. Note marked regeneration of bone and more firm union t fracture sit

electrolysis was responsible for the delayed union in all 3 cases.

When the plates were removed from the pa tients whose x rays films are shown in Figures 1 and 2 the screws were found to be corroded and loose. The wire which was used in the subtrochanteric fracture was real 18-8 stainless steel and this had remained bright and tight The Neufeld nails were all bright, but they were not tight and the absorption of the fem oral cortex which was present beneath the plates is clently seen in all 3 roentgenograms. The same is true of the absorption of bone around the screws. In Figure 3 a relatively large area of absorption is apparent in the cancellous bone around the proximal and distal screws and union is delayed to such a degree that even now 7 months after insertion of the nail I do not think that it is safe to remove the nail and this patient is still on crutches. In the femora shown in Figures 1 and 2 the absorption of bone around the distal screws is so marked that a pathological fracture through the previously normal bone sens a definite possibility. That this reas entirely

any other cause is evident from the increased strength of the bone evident in the x ray films which were taken several weeks after the Neufeld nail and screws had been removed On the basis of these x ray films, unrestricted weight bearing was permitted and the patients seem to be getting along all right. The smallness of the bone in the patient whose x ray film is shown in Figure 2 is due to a partial paralysis of the extremity from old poliomyelitis. The nail in this patient was too long and protrudes into the acetabulum. but this caused no pain or disability. In addition to the absorption of the bone immediately adjacent to the prosthesis, there is some new bone production on the medial aspect of the shaft of the femur in the areas near the points where the screws projected and even in the soft tissues around the projecting screws in

Figure 3
That the danger of electrolytic absorption of bone after internal fixation is not limited to the Neufeld nail is shown in Figure 4. This ilm illustrates the night femur was shortened 2½ inches in order to equalize the length of the lower extremities. An arrest of growth had occurred in the distal epiphysis of the

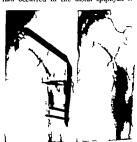


Fig Subtrochanteric fracture fixed ith Acefelt and sire \text{ ray films taken y months after operation.} Not marked beorption beneath plat advanted data serves also new hone formation on needs and of the first of the first postoperative yeary film.

opposite femur as a result of an osteomyclitis in early childhood. The postoperative con valescence was uneventful and she left the hospital 17 days after the operation walking on crutches The hip remained painful but she had no other evidence of infection. In Figure 4 are shown x ray films of the femur 3 months after the insertion of the blade plate and 2 weeks after its removal. The films show marked absorption around the plates and screws and considerable new bone formation It is interesting to note that the absorption of the dense cortical bone around the two lower screws is proceeding even more rapidly than is that in the cancellous bone. At the second operation the fragments were united the plate and screws were loose and there was no evidence of infection. The convalescence was uneventful and the patient left the hospital on the 14th postoperative day on crutches with instructions to bear a moderate amount of weight on the leg

Because of the danger of progressive bone absorption from electrolysis Venable (3) has warned against the use of vitallium and stain less steel screws or plates in the same opera



Fig. 3. Trochanteric fracture 6 months after insertion of Neutled nail. Union not yet solid. Note marked about position in the marrow canal around acrews and beneath nail, also new bone around projecting acrews on inner side of shaft. Still on crutches nail to be removed as soon as smuon is sufficiently advanced

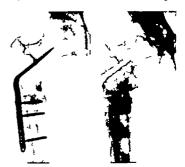


Fig. 4. Femoral shortening 3 months after fixation with Blount blade plate and 2 weeks after removal of plate. Note marked absorption especially of cortical bone around the two lower screws also marked new bone formation

tion or even in the same bone at different operations. The cases illustrated here indicate that the danger of electrolysis perhaps is even greater when different types of stainless steel are used.

Under present conditions it is necessary for the surgeon himself to be responsible for the quality of the prostheses which he uses for the internal fixation of bone. He cannot depend upon the hospital in which he works Figure 3 illustrates the fact that the correct length of screw is not always available. Only a few days ago while I was applying a bone plate to a tibia it was necessary to stop and check the screws in the Zimmer screw and drill rack When purchased this rack was filled with an assortment of 18-8 S-MO stainless steel screws of uniform diameter and thread with the standard type of head. When checked on the sterile instrument table, it contained some vitallium screws and 5 different types of stain less steel screws mixed indiscriminately and the 11/8 inch screws which were appropriate for the bone in this particular operation were missing entirely their slot and an adjacent slot were filled with screws 11/2 inches long

In addition to the heterogeneous mixture on the rack, there were probably a dozen other types of screws and plates in the operating rooms some of which were purchased in 1912 when the hospital was opened, and this hospital is not unique in this respect. Plates and screws do not deteriorate with age and as new ones are developed, they are purchased and added to the stock, but the old ones are not discarded and they are all mixed together. The average operating room nurse knows nothing of electrolyins and its effect on bone

In the light of what is known about the

deleterious effect on bone of electrolysis caused

by the use of metals of different composition for internal fixation it is just as important that the metals used for internal fixation of bone be standardized as it is that drugs be of uniform purity and potency. And, when a prosthesis like the Neufeld nail which is patented and the manufacture of which is controlled is supplied with screws which are of

different composition what may we expect of

prostheses which are purchased in the open market and are made by any one of a dozen or more manufacturers?

The surgeon can usually distinguish a vitallium prostness from one made of stinless steel unless the former is polished, but he cannot differentiate stainless steels of varying composition at the operating table. It is egue suggested that only stainless steel of a uniform composition be used for all prostness which are to be used for the internal or external skeletal fixing on blone.

### REFERENCES

KEY J. A. Arch. Surg. 94, 43, 613-636 T. YLOR, MORRER, NEUTELO ALDORD J. and JAMES, JACOB. J. BODE SURG. 944, 76, 707 J. YEXABLE C. S. SURG. GYA. Obst. 94, 74, 541. 4. 14. DEL CLUSHIES S. STOCK W. and Brick, 4. An. Surg. 1037, 94, 97, 7

# A STUDY OF THE VALUE OF LOCAL SULFATHIAZOLE IN OPERATIVE WOUNDS IN THE PROPHYLAXIS OF INFECTION

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THE power of sulfonamides when ad ministered by mouth or by vein to inhibit the growth of certain bacteria in the human body is well established Although this method of therapy has had spectacular success in the treatment of many infectious diseases such as lobar pneumonia it has not been effective in preventing infection in accidental or surgical wounds This may be due in part to the fact that many of the bacteria which cause wound infections are not susceptible to sulfonamides in the concentration that can safely be maintained in the body through systemic administration Since many of these organisms are inhibited in vitro by high concentrations of the sulfona mides it seemed logical to place the drugs directly in surgical and traumatic wounds. By this means a greater concentration of sulfonamide could be obtained in the wound than could possibly be achieved by systemic admin istration This practice first advocated in 1036 (6 II I3 I4 32) has become so popular that many surgeons routinely place sulfonamides in their operative wounds.

Strangely enough in spite of the extensive use of sulfonamides in human wounds for the purpose of preventing infection there is little published evidence to prove that the practice is of value. Many of the workers who have claimed that the local use of sulfonamides de creases the incidence of wound infection either have not employ ed controls or have compared a sulfonamide-treated series with a control series treated one or more years previously (3 5 12 15 19 20 26 27 29 30) This form

of comparison often leads to fallacious con clusions (22 24) because so many factors which influence the incidence of infection will vary significantly over these long periods. Those authors who have reported controlled series of cases have either reported only a small number of cases (4) or have not been able to confirm the opinion of those who be heve that the sulfonamides prevent or decrease the incidence of infection when placed in operative or traumatic wounds (16 23 25 33)

If a substance is recommended for application into wounds the effects of the material on wound healing should be known Critical evidence in regard to the effect of locally im planted sulfonamides upon wound healing is controversial Animal experiments have shown that all the sulfonamides when implanted locally may produce an inflammatory reaction and even actual abscesses (34) It has been reported that retarded wound heal ing and extensive cutaneous scarring is to be expected with the local application of sulfona mides (1 9 35 36) Others concluded that delayed healing is due to excessive amounts of drug locally and stated that when used in proper amount sulfonamides in no way retard healing or result in inefficient scar formation (4 17 18 20 21) After studies on humans it was found that sulfonamides may act as irritants. It was demonstrated however that the deleterious effects are shortlived and that subsequent healing is within normal limits (28)

Because of this conflict of opinion and because of the widespread use of these drugs in wounds we undertook a study of our own to evaluate the use of sulfonamides locally as a means of preventing infection in operative wounds.

The work described 1 this paper was done under a contract, recommended by the Committee on Medical Research, between the Office of Scientific Research and Development and N you Enterprise.

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Hospital.

# TABLE L-CLEAN WOUNDS

Bone operations Minor surmed cases Herniogrhaphies Laparotomica Total

# MATERIALS AND METHODS

Sulfathiazole was selected as the sulfons mide which according to theoretical consider ations would be most likely to be effective in preventing infection. Two preparations were employed sulfathiazole powder and a 20 per cent suspension of microcrystalline sulfathia zole in saline (5 7 8 31) The powder was sterilized before use by dry heat at 140 degrees Centigrade for 1 hour. The microcrystalline form was used as supplied by the manufacturer All of the wounds were closed without drainage Sulfathlazole was never packed in a wound but a quantity just sufficient to frost the surfaces was spread evenly throughout the wound just before closure Care was taken not to place sulfathia

zole between the skin edges. The nationts who were all admitted to one of the surrical services at the City of Detroit Receiving Hospital were followed personally by the authors from the time of operation until wound healing was complete. Frequent inspections of the wounds were made cultures were taken of any exudate and the condition of the wound was noted and recorded on special summary sheets

For purposes of study the senes of 576 pa tients was divided into two main groupspatients with clean surgical wounds, and nationts with contaminated wounds.

A clean wound was defined as one made de liberately by the surgeon and not contaminated during the operation by a bacteria laden material such as saliva feces, or pus. The contaminated wounds were either traumatic wounds or operative wounds which were con-

TABLE HE-CLEAN WOUNDS			
Desg	M el cases	Safections	Per cent would priections
+_	- 12		

# TABLE II. -- CONTAMINATED WOUNDS

Tranmatic 99 Appendectomics 73 Perforated alcers 74 11 12 13 70 Gastric reservicion 270 Bowel operations Miscellancous

> taminated with infectious material during the operative procedure. Only traumatic wounds made with a sharp object and which could be débrided and readily closed without tenuo were included in the series. Subdivisions were made in each of the groups in order to make the wounds as comparable as possible. Patients in each of the subdivisions were after

nated as drug treated or controls. The subdivisions of the clean wounds were wounds made for open reduction of frac tures (2) minor surgical procedures, such # lymph node biopsy (3) wounds made for herniorrhaphies (4) wounds for laparotomes The subdivisions of the contaminated operative cases were (1) wounds made to repair per forated peptic ulcers (2) wounds made for removal of acutely inflamed appendices (1) wounds made for gastric resection (4) wounds made for operation on the intestine and (5) a

miscellaneous group About 90 per cent of the operations wert performed by 6 surgeons of the resident staff. The skin preparation type of incision, and suture material were constant for each procedure

Except for 14 patients who had sulfonamide therapy systemically because of pulmonary complications, none of the patients received any chemotherapy other than sulfathiazole is the wound. None of these 14 nationts developed infected wounds.

# RESULTS

The distribution of the cases is shown in Tables I and II

# TABLE IV -CONTAMINATED WOUNDS

Dress	No of com	Infections	Per cent want
+	96		
			pa pa

Table III compares the incidence of infec tion in the clean wounds which were treated with sulfathiazole with those which received no drug. Five infections occurred in 128 drug treated patients making an incidence of 3 9 per cent while only 3 occurred in 142 patients who received no drug an incidence of 2 I per cent. The incidence of infection in the two groups is almost identical

A comparison of the contaminated wounds is shown in Table IV. In this series the in cidence of infection in the patients who re ceived sulfathiazole is less and it appears as though the drug exerted a beneficial effect However this difference is not statistically

significant (2 10)1

The wounds in which sulfathiazole had been placed were more indurated than the control wounds and there was a higher incidence of hematoma in the drug treated group These figures are given in Table V Wound separa tion was rare but occurred more often when the drug was not used locally

Periodic tabulation of the cases and tabula tion according to each surgeon demonstrated that the figures given in the tables were con sistent throughout the study

The organisms which caused most of the in fections were Staphylococcus aureus alpha beta and gamma hemolytic streptococci and Escherichia coli alone or in combinations.

No definite evidence was produced to show that there was any difference in the effect of suspension of microcrystalline sulfathiazole or macrocrystalline powder

# EVALUATION OF STUDY

The statistics obtained from this study are reliable because the control series is compar able with the treated series. By classifying the patients into the various groups there tends to be only one important varying factor -whether or not sulfathiazole was used as local implantation in the wound before closure There was no selection of cases for use of the drug These are parallel alternating unselected controls

Sulfathiazole when used locally in operative wounds just before closure caused an increase The statistical significance of the results were checked by Dr. Heary H. Paley of the department of mathematics, College of Liberal Arts of Wayne University

TABLE V - WOUND COMPLICATIONS OTHER THAN INFECTION

Type of case	Drug	N of	Is- created indura tion	Herea- toma	Total	Compli- cations per cent
Clean	+	18	,	6	\$	95
Cless		143	7	1		7.0
Contaminated	+	95	6	$\vdash$		Z.5
Contaminated		50	_	3	3	86
Total	+	84	15	8	43	1
Total		202	7_	6	_ 73_	7.9

in the incidence of wound complications notably increased induration with possibly de-

layed healing

In heavily contaminated wounds sulfa thiazole used locally seemed to decrease the incidence of infection but did not eliminate it In clean wounds the incidence was not apprecably affected The explanation of this divergence may be that in clean wounds there are not many bacteria and the incidence of in fection is usually low. Here the foreign body reaction of the drug and its tendency to hematoma formation overshadow its antibac terial effect. In the contaminated wounds there are more bacteria and the natural in cidence of infection is higher. Here the antibacterial effect of sulfathiazole is more important than its irritating effect on the wound and it decreases the incidence of infection. This treatment, however is far from satisfactory as the incidence of wound infection is still o per cent Furthermore applying the principles of statistical methods the difference in per centages of wound infections in the treated and control series even in the contaminated cases is not statistically significant and may be due merely to chance. Accepting this concent we could reconcile the findings in the clean and contaminated series. That is, there is no appreciable change in the incidence of wound infection brought about by using sulfathiazole prophylactically

# CONCLUSIONS

One can conclude from these results that sulfathiazole used locally in wounds does not prevent wound infection. There are several reasons for this conclusion

- The organisms which cause wound in fection are not very susceptible to the sul fonamides
- 2 Dead tissue and foreign bodies which are of necessity present to some extent in any wound, inhibit the action of sulfonamides
- 3 Sulfathiazole leads to increased bleeding and hematoma formation a factor known to predispose to infection

These disadvantages together with their proved inability to prevent wound infection should lead us to seek other means of decreasing the incidence of infection in surgical wounds.

# REFERENCES

Bick, F M J Am. M Ass 042, 185 C MFBLLL, H E Surgery 04 085-83 3 CANNIDAY J.E. Lan Surg out. 9 408-507 4. CASSERG M. L. J. Missouri M. Les. 940,

472 474 CHAMBIRS, L \ HARRIS, T \ SCHLM X F and Falsouse L. K. J. Am. M. \ms., 94 324-3 7

6. D'HARCOURT tal Rev san guerra, 938, 246. Onoted by Howes, F L. ( ) 3

7 Editorial Lancet, 94 2 9 8 Fracusor L K. J Am M Ass., 942 8 9 Hand o F and Heat A. H. Brit, M. J. 601-606

Hill, B. Principles of Medical Statustics, and ed. London The Lancet Limited 943 HOWES, E. L. \ York Stat J 31 044 44 2006-

20

12 JACKSON A S. J I ternat. Coll. Surgeons, ass. c. 11. Jafona, K. H. Deut med. Wachr 1936, 6 811.

Quoted by Houes, E. L. (1) 4. JENNEY N K., JOHNSKED L. W. and NELSON, M. C.

Surgery, 939 6 1 s. 15. JENEEN, N K., and NELSON M C. Surg Gys. Obst. 041, 75 34-48

6 JOHNSON E. K., WOLFF W I and LANGUAGE A V S. Ann. Surg., 1945 20 - 26.
7 JOHLS, C. M. BURLETT M. K., RYAN, A. E., and
DRUMMEY G. D. N. England J. M., 1943, 229.

612-646.

S. KIY J A. J Am. M Ass. O4 7 400-4 1. 9 Ibid., 943 2 003-006. 20 KeY J A and BURFORD T H. Surg. Gyn. Obst.

04 73 324-332. Ket J L, Frankel, C J and Burroup, T H. J Box

HIREHATED J W Surg Gyn. Obst 945, lox

20 RAVING LS and Love P H U S. N val M Ball, 20

Quoted by Howes, F L ( )

33. SOUTHWORTH, J L Am. J Surg 044, 66 445 54 54. T TIOR, F N J Am. M Am., 94 8 059-90 35. ZIVIZL, H. L. Surg Clin, N Incrica, 944, 11 6 0- 610.

16 Idem Ann Surg 914 0. 949-953-

# VASOEPIDIDYMAL ANASTOMOSIS BY PRODUCTION OF PERMANENT FISTULA WITH USE OF

# STAINLESS STEEL WIRE

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ZOOSPERMIA as a cause of sterility in barren marriages is a common find ing Hotchkiss (4) found that 18 6 per cent of the men in his series of 100 in

fertile marriages showed no spermatozoa in the semen. In my series of infertile couples 13 3 per cent of the men had no spermatozoa in their semen while in those couples in which the husband was either a contributing or a sole factor of the infertility the incidence of azoospermia was 26 per cent.

The absence of spermatozoa in the semen may be due either to failure of the testes to produce sperm or to blockage of the efferent ductal systems so that spermatozoa cannot pass into the semen The etiology of this con dition is often obscure I was unable to determine it in 60 per cent of my cases.

(The globus minor of the epididymis and the adjacent portion of the vas are the commonest locations for the obstructive type of lesion Pre-existing localized inflammations probably account for the majority thoughseveretrauma is not an uncommon cause. Bothe and Robin son have described congenital strictures which if bilateral would cause azoosperma.

Gonorrhea is the specific disease which has most frequently been shown to be a cause of the obstructive lesion. Of course such an infection must usually effect a bilateral blockage of the efficient ducts to produce an azoosper mia. However it is well to bear in mind that unilateral blockage can cause the same changes in the semen as that of bilateral leasons, if the opposite testicle is atrophic. Nonfunctioning spermatogenic tissue is a common sequela of cryptorchidism or mumps orchitis and occasionally follows severe trau ma to the testis. Unilateral testicular atrophy together with contralateral blockage of the epididymus or vas will result in azoospermia.

It is worthy of note that the gonococcus never attacks the epididymis of an atrophic

testicle. At least the author has not seen this occur nor has any reference to it been noted in the literatury,  $\Gamma$ 

Remedial therapy of sterility due to block age of the epididymides or vasa or both, has as its objective the re establishment of the patency of the ductal passageways and the subsequent liberation of the imprisoned In 1002 Martin devised an spermatozoa operation to accomplish this end. He united the vas with the epididymis using silver wire sutures thereby establishing an anastomosis of the patent sections of each and bypassed the occluded areas Hagner (2 3) pursued Martin's technique of vasoepididymal anastomosis and was able to report cures in 58 per cent of the cases in which the anastomosis was performed Humphrey and Hotchliss employed fine arterial silk as suture material Hotchkiss (5) states Successful results should reach about 20 per cent of those operated upon and yet the failures are no worse off than prior to operation Nevertheless most urol ogists have had so many failures with the Martin Hagner method that commonly the sterile patient is advised against submitting to any surgical treatment

Recently the author has devised and per formed an operation for vasoopididymal anastomosis which appears to promise better chances for successful results. This operation is a modification of the Hagner Martin method and introduces a new principle in that a permanent fistula is produced between the lumen of the vas and the globus major of the epididymis. This is accomplished by means of stainless steel wires' which are in

The use of stainless steel wire as the least invitating foreign material both for sutures and I to the production of the fastial, that taked Boy site may be used for the anatomorphic material. He records that D J ha Draper has demonstrated that either silver or nickel key when may remain! the lumen of the ductus deferences of the dog for months without causing inflammatory reactions or foreign body response.

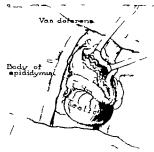


Fig. 1 The testicle epidelymis, and cord have been detweed from the scrotal at The vas has been isolated and 1 held up by umbical tape 1 this and the following illustrations the vas and epidelymis have been drawn disproportionately large.

serted into the lumen of the vas through the incision for the anastomosis, passed upward in the lumen and out through its anterior wall then brought out through the skin of the scrotum where the ends are fixed with shot. The lower ends of the wrees are passed through the window cut in the globus major for the anastomosis and out the opposite side of this organ. They are then passed through the tunica vaginalis and the skin of the scrotum below the incision and fixed with shot. These wires are removed in 10 to 14 days. The steps of the operation are given in the following description.

Spinal anesthesia is the method of choice

The scrotum and pubic region are prepared as for any intrascrotal operation. A longitudinal incision 5 to 6 centimeters long is made on the lateral anterior surface of the skin of the scrotum. The underlying layers of the muscle and fascia are incised the tunica vaginalis is opened and the testis, epididymis, and adjoining portions of the cord including the vias, are delivered (Fig. 1)

The testicle and epididymis should be examined for any gross pathology. The vas is isolated and a convenient point is selected for anastomosas with the globus major of the

epididymis. An oblique incision is then made across its anterior wall to expose the human A dilute solution of methylene blue is injected into the terminal segment. A free flow of fluid will indicate that no obstruction exists distal to this point. A slight blockage might be overcome by the introduction of a strand of silkworm gut into the vas, thereby subsequently permitting the fluid to pass by the occluded point. If found obstructed at one site it may be possible to perform the oper ation at a slightly higher level. Upon establishing proof of patency the incision is then extended longitudinally and its margins are trimmed so that an oval window about o.; centimeter long is produced (Fig. 2) Attention is now turned to the enididymu, and an oval opening of approximately the same size is cut out of the lateral superior portion of the globus major of the epididymus (Fig. 3 C). The secretions from the excised tubule are immediately examined microscopically for spermatozon. It is encouraging to demonstrate them in the epididymis at the point selected for anastomous but the operation should not be abandoned if none is to be

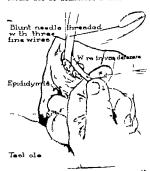


Fig. s. A small incision has been made in the was, as & has been enlarged and made oval in abape. There are threaded on blant ended needle have been passed through the incision, up the lumen of the was and out through in wall.

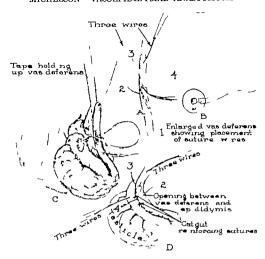


Fig. 3. A The group of three wires has been peased through the ovalluciation in the was, up the inners of the vas, and out through its wall. The four wire sturres (? 3-3, 3) to make the anastronosis are shown. B Diagrammatic cross section through the was showing depth of anastronosis sure wires in its wall. C, The rowal fenerar has been cut in the globus major. The needle carrying the fatula wires from the was has partly been passed through the globus major. D The anastronosis between the vas deferent and epickidymia has been completed. The three wires which temporarily maintain the fatula are shown. Their course is indicated by the dotted line. The four anastronotic siture wires have been passed and tied. Three of them have not been cut and are above.

found This policy is substantiated by precisely such an experience on one occasion. Although a smear from the epididymis was negative a biopsy of the testis secured at the time of operation revealed spermatozoa to be present in the seminiferous tubules and ultimately they appeared in the semen when it was examined after recovery from the operation (Fig. 5 a, b)

A blunt nosed straight cambric needle threaded with three stainless steel wires (No 36 20 to 25 cm long) is then passed up the lumen of the vas for a distance of about 25 to 30 centimeters and then carefully pushed through its wall (Fig 2) The needle is removed

and the wires are threaded on a cutting skin needle. The lower ends of these three fistula producing wires are then threaded on a suit able size Ferguson needle and passed through the window cut in the globus major and out the other side of the epididyms (Fig. 3 C). The wires are then threaded on a curved skin needle and left loose. At the margins of the incision in the vas four stanless steel wire sutures (40) are passed through its wall, but not into the lumen (Fig. 3 A B). One each at the superior and inferior angle of the in cision and one each midway laterally. These sutures are then passed through the tunica vaginalis, and several loops of the epididymai



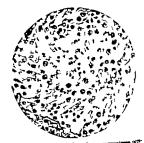
Fig. 4. The operative wound in the acrotium has been closed. The matures satures are not shown. The ends of the group of the three fistula maintaining. The have been brought out through the scretal skin and are field in place by shot. These sures are removed to 4 days post operative.



Fig. 5 Bropsy of testis. Case of axoospermia d ration 814 years a, left, Los power b right, il gh power Nor mal testicula mean The very small black bodies I toules are spermatoson absent in smear from

tubule at corresponding points on edges of the window already cut in the globus major. The inferior and posterior lateral nuture should be approximated and ited first, the the upper and anterior lateral sutures. One or two sutures of catgut fix the vas to the epididymis about 0.5 cm to 10 continents below the anastomosis (Fig. 3 D). The tesia and other structures are then returned to the scrotter.

The lower ends of the fistule-producing wires which have been threaded on a skin needle are passed through the tunica vagnals and the skin of the scrotum about 2.0 centmeters below the end of the incluon in the scrotum. Similarly the upper ends of these wires are passed about 2 o centimeters above the upper end of the scrotal incision. The tunica vaginalis is sutured with catgut after first the introduction of an exploring finger to make sure that the organs are in proper position. The incision is closed with deep mattress sutures of silkworm gut and the sku with a running catgut suture. Before the incision is closed it is advisable to measure on the wires where the shot should be applied so that there will be no tension. Following the closure of the skin measion both the lower and upper ends of the wires are shotted separately (Fig 4) Tincture of benzoin com-



epididymus t time of operation. Activ spermations perent in Jaculated sensen specimens, buch ere taken daring postoperative period of to 7 months (last examina-

pound gauze and a large sized suspensory are applied with plenty of gauze for pressure

The fistula wires are removed in 10 to 14 days without any difficulty Convalescence in all cases has been uneventful

The patients have had no serious pain and no complications have occurred The swelling of the soft tissues remains 3 to 6 weeks. After to 4 weeks the site of the anastomosis can be felt as an indurated mass about 25 to 30 centimeters in length and about 10 centimeter in width. This mass gradually subsides until in from 2 to 4 months it shrinks to a small hard body about 1 5 by 0 6 centimeter There is very slight tenderness on pressure and the patient experiences very little if any discomfort after the first couple of weeks.

With the exception of this area of anastomosis in all cases the testes epididymides and vasa appear grossly normal As there has been no occasion to explore the patients oper ated upon no microscopical examination has been possible. In experiments upon dogs the author found no changes in the testes al though small fibrotic areas were found in the globus major with fibrotic occlusion of the vas at the anastomotic area.

This operation has been employed in 5 cases of azoospermia due to blockage of the ductal systems. The gonococcus had been the primary causative agent in 4 cases whereas the fifth was traumatic in origin. Bilateral occlusion was present in 4 while the fifth had unilateral testicular atrophy with occlusion of the epididymis on the opposite side

The operation was completed on both sides upon 2 of the men and in the remainder the anastomosis was done on one side only

Spermatozoa have been found in the semen following operation in 2 of the cases. Atrophy of one testicle precluded the performance of a bilateral anastomosis in one of these patients. There has been one pregnancy

The types of cases which have failed to demonstrate spermatozoa in the semen are as follows. The number of weeks postoperative that the semen was last examined is given

Type 1 Patient suffered from postgonococcal bilateral vasoepididymitis. Operation was performed November 7 1044 Bilateral anastomosis was done

Semen was last examined 3 weeks after operation. Type a Patient suffered from postgonococcal bilateral vasoepididymitis with unilateral completely occluded vas Operation was performed Janu ary 30 1945 Unilateral anastomosis was done Se men last examined 11 weeks after operation.

Type 3 Patient suffered from post traumatic bi lateral occlusion, Operation was performed October 31 1944 Unilateral anastomosis was done Semen was examined 26 weeks after operation 311

Spermatozoa may appear in the semen any time up to the twelfth postoperative month and therefore the procedure cannot be com pletely evaluated until 1 year has passed

# SUMMARY

Erve cases of azoospermia due to blockage of the ducts of the vas and epididymis are herein reported A new operation is suggested in which stainless steel wires are interposed in the fenestra of the vasoepididymal anastomosis to further the development of a perma nent fistula between these two structures The series of cases is small but the percentage of successes is comparatively high further development of the technique it is hoped that more favorable results may be achieved 7

# REFERENCES

- BOTHE, A. E., and ROBINSON F K. J Urol Balt.
- 1933, 20 425 412 HAGYUR, F. J. Am. M. Am. 1936, 107 1851
- 3. Idem. The operative treatment of sterility in the male a further report. Read before the Section of Urology at the grat Annual Session of the American Medical Association New York, June 14 1040 (unpublished) Quoted by Hotchkiss, R. S. (5)
  4 HOTCHKISS, R. S. N. York State J. M. 1041 41 6,
- 564. 5 Idem. Fertility in Men Philadelphia J B Lippincott,
- 1944. HUMPHREYS, G A. and HOTCHKISS, R. S J Urol.
- Balt. 1030, 42 8 5 820. MARTIN F Uni Pennsylvania M Bull 1002 15

# THE TREATMENT OF VARICOSE VEINS

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ROWING experience with variouse veins of the legs gives rise to more accurate understanding of this condition and makes possible the expansion and refinement of therapy The treatment of 200 pri vate patients seen since January 1943, forms the basis of this paper. All the details of diagnosis. treatment, and follow up have been carried out by me. It is my belief that this continuity of super vision tends to give the best results. Most clinics have to overcome the difficulty of insufficient per sonnel and an ever changing house staff. In addtion since their chentele is from the lower income groups the staffs must constantly surmount ignorance poor hygiene, and lack of co-operation To a large extent these factors can be discounted in the present study

Many of these patients present a superficial ameness which not only dulls interest but stifles critical appraisal. One can only say that careful examination and choice of treatment bring gratifying results.

# ANATONICAL

There are three vein systems in the leg (6) (a) the short or external or leaser suphenous, (b) the long or internal or greater suphenous, (c) the femoral or deep circulation. There is also a variable network of syperficial veins, particularly about the knee thigh and buttocks which can become various under certain conditions. These varicosities are not always associated with valvular deficiences hence, in certain cases, suphenous ligation is not indicated

### PATHOGENESIS

Absence of solver Stockes in conductors by Eger and Casper showed absence of valves in the er ternal iliac and femoral veins proximal to the onfice of the appearous in 36 8 per cent of cases. In this senes one or both sides were deficient in valves, the left and approximately twice as often as the right. No attempt was made to correlate valve deficiency to the presence of varicosities. The conclusion that on an anatomic basis there is a 36 8 per cent minimal potential incidence of varicose veins of the lower extremities is an interesting hypothesis.

l aire incompetency Routme tests for valve competency are applicable to any segment of vein one wishes to study They do not permit distinc

tion between developmental absence and acquired deficiency. It seems reasonable to assume that normal veins subjected to continued abnormal stress could be dilated to a point where the valve no longer close. This frequently happens in isdividuals following femoral phlebothrombons when the superficial veins serve as dilated coloterals. Once the valve rings are stretched, incompetency increases, even after recanalization of the thrombosed vessels. Occasionally however, I have found valve incompetency in the perioral ing veins- blowouts -which drappeared for lowing bedrest and elevation only to return on prolonged unsupported standing. The moral of this is to examine thoroughly for "blowouts when the patient is first seen. At this time the veins are usually biggest and the maximum nonber of 'blowouts can be discovered and marked for excision.

Valve incompetency exists most often at the greater suphenofement junction—making accessive the classical suphenous ligation. Usually the incompetency exists when the greater suphenous system is variouse. Occasionally the suphenous vein at operation is small and normal in uperation. In such cases there is untuily a "blocout farther down the thigh—sometimes only or a linches below the suphenous bulb.

Another frequent point of incompetence is it the ornice of the lesser sephenous vein. This codution may exist by itself or be associated with greater sephenous varioes. Incompetent who in the perforating veins usually do not exist without one of the valvular defects above noted.

Venous pressure in standing Individuals is the same in 'normal' as in vancous veins (c) If corresponds roughly to the hydrostate pressure of the blood column leading to the heart. In the recumbent position, in both antecubatia and aphenous veins, pressures are cirvated in patients with large varicustites. This is probably due to increased blood volume caused by partial emptying of the capacious varicuse reservoir Tathornman in patients with mild degrees of hard disease is frequently relieved by proper trainest Orthopnes in patients with mild degrees of hard disease is frequently relieved by proper streams.

When the veins are full, as in the erect posture, blood flow in varicosities is upward, although slowly as u be shown by venography The

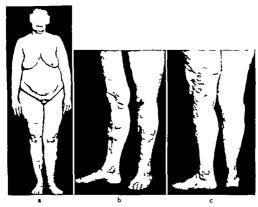


Fig. 1. a, Deficient vascular type abowing bodily configuration. Note irregular mottled skin. b Same patient. There are variouslities of the right greater suphenous system. c, On the left adde the varicosaties arise from a "blown in the upper poster or thigh. Neither suphenous system is involved. Note telanguectura about ankle."

idea that blood flows out of the fossa ovalis and down the suphenous vein is erroneous and implies a pressure differential that does not exist. In normal veins the flow is rapid because of (i) the smaller caliber and (2) muscle action. The latter compresses a vein segment between two valves, blood flows through the upper valve which closes when compression ceases and the segment again fills from below. When valves do not function this progression is not maintained and the blood stagnates (Fig. 2)

Constitutional factors Empirical observations allow the segregation of some of these patients into groups according to body type. (a) A deficient tascular group (Fig 1) In this group there is ex tensive superficial venous dilatation manifested by capillary hemangiomas telangiectases and a multitude of small varicosities. The legs are usually large out of proportion to the rest of the body Sometimes there is immense adiposity of the buttocks, thighs, and legs suggesting glandular dysfunction. The larger vessels when exposed at operation are thin walled and tremendously dilated. There may be saccular bulges up to 4 or 5 centimeters in diameter. There may be associated hemorrholds or vulvar varicosities. The overlying skin is irregular and mottled, becoming easily discolored. I have seen this type more often in females but frequently in males of the Froch lich habitus. Treatment is apt to be prolonged, difficult, and unsatisfactory (b) A type apparent by deficient in connective tissue (Fig. 3). This individual is usually male, lean, muscular of athletic type with a long spare build. In him vances appear in early adult life and gradually enlarge through the years. He has little sub-

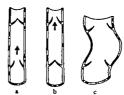


Fig. 2. a, Normal segment of vein between two competent valves. Upper valve closed, supporting blood column while segment fills from below b, Normal vein segment. Vinsclo etlon compresses segment partially emptying it, lower valve holds tight. c, Varicnes segment. Valves in competent. Muscle action can force blood in either direction. Upward flow not accelerated



Fig. 3. a, Type desclent in connective tissue. Long, spare build. Bulater I enlarged external inguinal hope Small left direct inguinal hope. Small right vancoccie. b, Same patient. Suphenous enlarged from groin to internal malledus. N. ther vances. Other legs normal.

cutaneous fat so that all his veins are prominent He may have an associated variencele and is subject to inguinal hermin. Telangiectasia and pigmentations are uncommon. Treatment is more easily carried out and results are generally good. (c) Consental venous abnormalities. These enlarged veins may be associated with other stigmas such as extensive hemangiomas. They are characterized by abnormal vascular connections and extensive valve deficiency. I have seen a patient with the entire right lower extremity covered with capillary hemangiomas extending onto the abdomen and buttocks. The enormously dilated right saphenous vein passed over the right fossa ovalis across the pubes and drained into the left femoral through the left fossa ovalus. There were numer ous free connections between the abnormal vein and the right femoral vein. This type of varicoulty is evident at birth or at a very early age.

### DIAGNOSIS

The first step is to decide which venous systems are involved. According to Larson and Smith the lesser saphenous valve was incompetent in 7 per

cent of any cases. Obviously if this is the only venous abnormality other ligations are not person sarv A large vein or veins appear in the positivi space near the flexion crease, and the associated varices involve the calf and ankle. If there is incompetence of the suphenolemoral valve the erenter sathenous vein is usually enlarged and may be palmable throughout its course down the inner aspect of the thigh behind the internal condule of the femur ending in varices involving the medial and antenor part of the calf and les In very stout people it is difficult to locate the veins accurately. If there is doubt on this some the greater sanhenous vein should be limited as matter of routine. It may appear that neither ven pattern exists. In this case two situations may be present either (r) there is we income tence in the connections between the unerfool and deep years, or (2) there are isolated morepetent 'perforators. In the first instance so lizations are necessary and in the second, route saphenous ligation is useless. The 'perforator Itself must be located and excised

The patient to be tested for competence of the saphenofemoral valve rests supme with the jeclevated. Gentle massage in a proximal direction will hasten emptying of the veins. A tounised is applied high on the thigh firmly but not tight enough to obliterate arterial pulsations. The patient them stands immediately if the entry system of varices remains empty and then legist to fill slowly from below one can assume there is no fill slowly from below one can assume there is no fill slowly from below one can be the transition of the suphenofemoral valve is demonstrate of the suphenofemoral valve is demonstrated (Note This down flow of blood cases when the venous reservoir is filled. The blood then fine above to move and the supplies of the suphenofemoral valve is demonstrated.

If during the test described the veins fill ripidly while the tourniquet is in place it is presumed that there is a 'hlowout present The level of the early influx of blood will give a clue to its location.

To locate 'blowouts. Pratt devised the following. An Ace bandage as applied from the toes to the groin and a tourniquet placed on the thosh abre this area. As the bandage is removed, a sasker protruston of a collection of veins above the point of incompetence. A second Ace bandage, which may be wrapped from above down, expose only a small area at a time and is helpful. (Fig. 4). This is easily and quickly doce. I believe, however that the lower Ace bandage keeps the varices only partly empty, that, as it is unmoled, blood fills the visible portion of vein and that the blood may have come from below and not acers sarily year of bloowed.

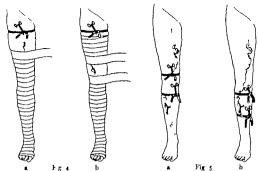


Fig 4. a and b Method of locating multiple blowouts using a tourniquet and two chastic bandages. (after Pratt)

Fig. 5. a, The leg has been elevated, thus emptying the veins, and a segment of vein isolated between tourniquets. The segment has remained empty in the errest position indicating an absence of blowouts in this segment. b, Test repeated with tourniquets reapplied lower down. Segment has rapidly filled indicating presence of blowout. Note Veins below lower tourniquet remain empty indicating absence of blowout.

To locate these blowouts more exactly and to prevent the upward reflux from giving false positive tests for blowouts. I make repeated application of the tourniquet at different levels emptying the veins by elevating the leg between each application. The presence of a suspected blowout in any vein segment can be readily detected by using two tourniquets (Fig. 5). The vein is emptied and a tourniquet is applied on either side of the suspected site. If the isolated segment fills there is a Dowout somewhere between the constrictions. By repeating the procedure shifting the tourniquets the blowout can be accurately located and marked

Measurements As a routine I measure both legs, selecting arbitrary points of reference. The ankles are measured at their slenderest level, the calves and thighs at a point 15 centimeters below and above the upper margin of the patella, respectively. Accurate comparison can be made later.

Perties test This test is based on artificial occlusion of the superficial venous return by a tourniquet placed around the upper thigh The patient then walks for 5 minutes. If the deep venous circulation is blocked the leg becomes congested swells, and is uncomfortable. This means that the superficial venus, both varicose and normal, are acting as collaterals. In this in

stance saphenous ligation is deferred until recanalization of the deep veins has occurred

Tests for arternal disease. The dorsalis pedis and posterior tibial arteries are palpated as a routine. If these pulses are full the arterial circulation is considered to be adequate. If palpation is difficult or impossible the arternal circulation may be normal since these vessels may show wide variations in caliber and location. Oscillometric readings are then done as an aid in determining the degree of arternal pulsation. The oscillometer should be used of course, in all cases in which there is a history of daudication abnormally cold extremities or other history suggestive of arternal insufficiency.

Varicosities due to valve incompetence are treated by surgery even in the presence of ad vanced arterial insufficiency. Saphenous ligation with eradication of incompetent perforators is carefully done. Sclerosis is never attempted in the presence of arterial disease. Acc bandages are not worn postoperatively but rather all efforts are made to promote vasodilatation during the post operative state. These measures include use of (i) a thermostatic heat cradle (2) slicohol by mouth (3) other vasodilators such as typhoid vaccine or depropance, (4) metholyl iontophoresis, (5) lumbar sympathetic novocain nerve block.

Laboratory data. Erythrocyte sedimentation rate This is a valuable index of phieblitic activity. It should always be done if a history is obtained suggesting deep or superficial thrombophieblitis. Elevation of the rate may cause one to defer operation and certainly contraindicates the use of selerotics.

Blood count Certain patients have multiple episodes of thrombosis on the basis of polycythemia. Measures to bring the red cell count to normal should be taken before surgical intervention is undertaken

Y-rays Venography has given valuable information regarding blood flow in various evens but has a limited application. It is valuable in demonstrating deep venous occlusion and may help to estimate some congenital anomalies. At best it serves only to confirm the clinical findings.

# TREATMENT Nonoberative Cases

If no valve deficiency can be demonstrated or inferred, it is useless to interrupt surgically any of the veins, varicose or normal. The cases falling into the nonoperative group show scattered, wan dering varices of the superficial type, usually of medium caliber but frequently in smaller veins and amounted with telanguectama. They are unsightly but rarely cause secondary effects, such as edema or ulceration. The treatment is by injection of a sclerotic. I use sodium morrhuste 5 per cent with benzyl alcohol as a routine and sodium ricinoleate 31/2 per cent as an alternative in the rare case which shows sensitivity to the morrhuate. All patients should be given a preliminary test in jection of 0 3 cubic centimeter of the sclerosing substance at the first visit. This injection is in troduced into one of the varices and usually causes no reaction whatsoever Very occasionally generalized urticaria results and even asthmatic symptoms develop This situation should respond to an injection of adrenalin followed by ephedrine orally. I have never seen a true anaphylaxis. In two patients sensitivity developed to the morr huate compound after a course of injections followed by 4 to 6 weeks rest periods. The injections were discontinued because of mild delayed urticaria. Ethylamineoleate has been tried but its effect seems less predictable and the aderosis less firm and extensive than that from the morr

Injection is accomplished with a fine thorp No 27 hypodermic needle. The patient stands—on a table with hand rails—so that the site of injection is roughly at the surgeons eye-level. The hight abould strike the leg tangentially so as to sil

houette the vessel. The syringe is held in one hand so that aspiration can be made when destred without changing the grip. Usually if the syringe is held downward, blood will flow into the solution without aspiration. The other land serves to steady the tissues during the venopence ture. When one of these varices is excessively large, it must be emptied before injection is mide. Too much blood dilutes the sclerosing agent, maimizing its effect. An excessively large clot forms. is painful, unsightly and disappears slowly To prevent this clot formation the leg is elevated after insertion of the needle and the vein a emptied before injection is begun. Sometimes the maneuver is difficult. When this difficulty area, the patient lies supme and the veins are distended with the aid of a tourniquet which is removed after insertion of the needle.

From 1 o to 2 o cubic centimeters of solution are injected, depending on the size of the yen and the individual's reactivity. The latter varies consierably. The site of injection is compressed with alcohol sonked cotton wasps used for sterilization and maintained in position with two 4 or 5 inch strips of adhesive 1 inch wide. The length of von sclerosed per injection is enhanced by the westing of an Ace type bandage for a or 3 days. The bandaging keeps the sclerotic from "pudding and spreads it along the vein while preventing in flux of new blood If this type of bandage b objected to a 4 inch square of cotton 1 mch thick applied over the injected area and bandaged hito place for 48 to 72 hours may be less unsightly Injections are usually made at weekly interest Sometimes four injections totalling 4 o cubic certimeters are made in one sitting and are well tolerated

Occasionally palliative treatment is the only sersible course. Operation is contraindicated some times by extreme age and often by other more sersous, illness. Messures taken include (1) Art bandages. These are put on before arising in the morning For long continued use Ace type bandages, flesh colored, with elastic threads inter woven in 3 or 4 inch widths are most antisfactory (2) If edema persuate periods of elevation during the day and continuously at night are scheduled (1) If there is a tendency to infection daily hot saint soaks are instituted. Should there be evidence of a fungous dermatitis, warm potasuum permas ganate soaks 1 5000 are applied, daily at first, then alternately with the saline souks, and finally at weekly or other intervals sufficient to control the altuation. (4) Dressings for ulcerations usually are made with some bland ointment. I have no routine and often one must find the best applica

tion by trial and error Frequently, a plain dry dressing is the best, and this is soaked off daily I have tried the various sulfa ointments, such as Vitamin A and D ointment, chlorophyll oint ment and others, and have found nothing for average use better than bonc acid ointment (5) Weight reduction in the presence of extreme obesity is important.

# Operative Cases

Preoperative care is directed toward (1) re duction of edema and (2) elimination of infection Generally the wearing of an Ace type of bandage with periods of elevation during the day and at night will suffice to reduce edema. For the most severe cases 1 to 2 weeks in bed at home may be necessary It is hard to get co-operation from some individuals so that it may be necessary to admit them to the hospital 4 to 7 days preopera tively for close supervision. Hot saline soaks for infected ulcerations are carried out daily with appropriate dressings. These can be augmented by potassium permanganate 1 5000 soaks should fungous infection be present. In stout people weight reduction is begun immediately. The obese often have a troublesome groin intertrigo which must be cleared up before operation can be safely done. Frequent baths are followed by thorough drying sprinkling with thymol iodide powder and the insertion of gauze between the skin folds to keep the area dry. In cases of acute suphenous thrombophlebitis in which early ligation is to be done, it is my custom to give sulfadiazine several days before and after operation. This step is rarely necessary following femoral thrombophle bitis because the time lapse between acute infec tion and operation is sufficiently long (6 to 12 months) for infection to subside. If sclerosis is to be done, a preliminary test injection of o 3 cubic centimeter of sodium ricinoleate is made into a suitable varux.

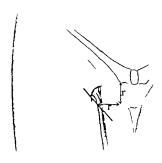
The patient is admitted to the hospital the evening before operation. For high saphenous and blowout ligations the skin is shaved from toes to umbilicus and a low enema is given Nembutal 11/2 or 3 grains is given for sleep and repeated the following morning 11/2 hours before operation Morphine sulfate 1/6 grain and scopolamine 1/150 grain are given 45 minutes before operation. Most patients will then sleep soundly during the operative procedure. Immediately before the patient lies on the table the location of 'blowouts is checked and the actual lines of incision marked heavily with indelible pencal.

Choice of operation Patients showing incompetence of the saphenofemoral valve should have a high saphenous ligation with division of all tri butaries. Incompetent perforators should be ex cased Retrograde sclerosis after the method of Pratt is done in uncomplicated cases. Sclerosis is contraindicated (1) following acute saphenous thrombophlebitis (2) in the presence of vasospastic disease of the lower extremities—painful moist postphlebitic extremities with or without ulceration react unfavorably and sometimes alarm ingly to sclerosis—(3) in the presence of oblitera tive or other peripheral vascular disease as for example, arterlosclerosis or thromboangiltis obliterans, (4) following abnormal reactions to the test dose such as urticarla asthma severe local pain or inflammatory reaction

If the saphenofemoral valve is intact it is only necessary to excise any 'blowouts' which may be present or to highte the lesser suphenous vein at its termination. I also excise many extremely dilated segments as these are obliterated with difficulty and may break down following retrograde sclerosis. If the saphenous vein is dilated through out. I usually interrupt it just below or just above the knee even in the absence of 'blowouts. This lessens the tendency to recanalization of throm bosed vances in the calf and leg

Operative technique Shoulder pieces are in stalled so that moderate Trendelenburg position can be used if desired. Many large varices remain distended when the patient is in the flat position This distention is undesirable if retrograde sclerosis is contemplated. The excess blood dilutes and 'puddles the sclerotic and causes excessive clot formation. About 10 or 15 degrees of Trendelen burg position is sufficient to drain the venous channels and is done when necessary. This appears to be more easily done than the bandaging technique of Pearce. It also leaves the legs free for secondary ligation.

The operative technique is modified from that of Pratt Local anesthesia with 1 per cent procame hydrochloride is used. A point i inch (2 5 cm.) below and 1 inch (2 5 cm.) lateral to the spine of the pubis is selected and an intradermal bleb is made (Fig 6) This spot should be over the saphenous bulb and occupies the center of the incision. In obese people the inguinal fold may be considerably below this spot. It may even be necessary as Dunlop suggests to make the wound on top of the fatty apron. The line of in cision, parallel to Poupart a ligament is infiltrated and the area anesthetized through the original bleb by advancing and retracting the needle point fanwise through the subcutaneous tissue. If the point of the needle is in continuous motion it is not necessary to test for vascular penetration by



THE 6 Location of incusion

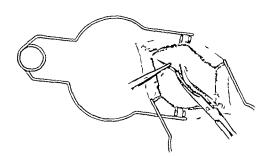
withdrawing the syringe. About 40 cubic centimeters of the anesthetic are generally used

An incision 2 to 3 inches (5 o to 7 5 cm ) long is made, depending on the thickness of the fatty layer The operation is more quickly and safely done through an adequate incision. The vein is

safely exposed by sharp dissection as traction is applied to the wound edges. Two layers of substantial superficial fascia are met and divided. In thin persons the deeper layer lies close to the vem. In the obese there is often considerable by under this fascia through which the vein mos-Retraction is by means of spring self retaining to tractors. The vein is usually met at about the level of its lowermost tributary. It is dissected free from its bed Exposure of the saphenous helb is then completed by separating adventitia and fascia from the year and dividing noward. The makes necessary a minimum of retraction (Fig. 7) In the majority of cases the superficul eutr nal pudendal artery crosses over the bulb. It serves as a landmark and may be divided if necesary. Often the artery passes next beneath the saphenous vein and occasionally it divides, sending small branches both over and under the veh-

The saphenous is freed up to its confluence wal the femoral and all tributaries are divided by tween ligatures of No o chromic catgut From three to five are usually encountered. The sa phenous is then ligated as high as possible will chromic No. o cateut. It is clamped distal to the and again 1 inch (15 cm) lower. The mteriesing vein is removed. The provinal stimp r secured with a C silk transfixion ligature distal to

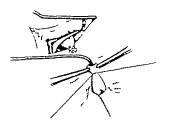
the first tie. The distal stump is grasped laterally with clamps (Fig 8) and the occluding clamp is re



I g 7. Fasca di ided upward along course of vein t. facilitate exposure of saphenous bulb and heation of tributanes

moved. A ligature of chromic No o catgut is reached with a half knot and a No 6 French ureteral catheter is introduced into the vein. It will usually enter 25 to 50 centimeters without difficulty. Occasionally the tip catches in a valve leaflet or tributary opening. Partial withdrawal and axial rotation of the catheter will usually enable it to slide past these obstacles but one must be careful not to push too hard as the vein wall is easily penetrated.

This procedure must be done quickly as the vein goes into spasm almost immediately. If the catheter becomes blocked and must be withdrawn reinsertion is almost impossible. When the cathe ter is at maximum insertion the half knot is tightened to prevent regurgitation, and wet saline sponges are packed about the vein opening to prevent any back flow into the tissues From 3 o to 10.0 cubic centimeters of 31/2 per cent sodium ricinoleate solution are injected, depending on the size of the varices and the depth of insertion of the catheter. Twenty five per cent of the sclerotic is first injected and the remainder is distributed uniformly along the course of the vein as the catheter is withdrawn. Occasionally one is unable to penetrate further than 20 centimeters or so even in the presence of a large saphenous vein. This is usually due to excessive tortuosity sclerosing solution can then be distributed distally by means of a gentle sweeping massage while it is being injected. A larger amount can be introduced with safety and more complete sclerosis obtained The knot is completed and reinforced with a C silk transfixion applied above the catgut tle. (If the vein is penetrated below this the



Ing 8. Technique of retrograde scleross. Half knot preents reflue.

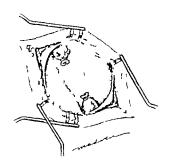


Fig. a. Operative site ready for closure. Thoroughly irrigated with saline

sclerosing solution will leak ) The wound is firity gated with saline (Fig. 9). Several interrupted line catgut sutures are placed in the superficial fascia and the skin is united with interrupted silk vertical mattress sutures.

While the assistant closes the wound the sur geon attends to the blowouts. The previously marked lines of incision 1 to 2 inches long are heavily infiltrated with 1 per cent procaine. This infiltration serves to separate superficial veins from the skin to which they closely adhere follow ing phlebitus or chronic dermatitus and edema of long standing The skin is cleanly incised and retracted with small rakes. Allis clamps necrotize the skin and should never be used to grasp skin edges. The vein is grasped freed and all avail able tributaries are clamped and divided. The T. shaped junction between vessel and perforator is sought. The vein is divided above and below between clamps to prevent escape of the sclerosing solution Should any escape the wound must be immediately flushed with saline. The vessels are tied with No oo plain catgut. Chromic catgut was found to be poorly absorbed by this thick ened poorly vascularized tissue particularly in the lower leg. The wound is closed loosely with two or three vertical mattress silk sutures

Ligation of the lesser suphenous is accomplished in a similar fashion (Fig. 10)

Dressing must be carefully done. The femoral inc. ion is entirely scaled with adhesive especially in women. The lower gauze dressings are held in place with diagonal rather than circumferential.



Fig. o. Variousities of lesser suphenous system. a, Posterior view. Large venous. Bannel marked where it lifes beneath fason. Y marks site of ligation. by Oblique view. Note enlarged greate suphenous coursing down modial aspect of knee. An excellent result was obtained in this case by ligating and scienous bells greater and lesser suphenous webs.

strips of adhesive to obviate tension in the event of swelling. If retrogrado sclerosis has been done the femoral and leg regions, groun to ankle, are pudded with combination dressings and the entire extremity bandaged firmly with two 4 inch Ace type bandages. If sclerosis has not been done, it is unnecessary to pad the leg but a 4 inch Ace type bandage is applied from toes to knew

Postoperative care Immediately the operative dressing is finished the patient is made to walk for 5 to 10 minutes. This distributes the accrosing solution more evenly enhancing its effect. Fudding' is prevented and danger from ven break down and its attendant difficulties is minimized. Following this, the patient goes to bed. There-after he is required to walk to to 15 minutes every a hours until he becomes completely ambulation. The outer bandages are removed after 6 hours and additional pedding is placed over any point which evens unduly irritated. The padding a discarded

after 3 to 5 days. The Ace bandages are replaced daily Most patients go home wrange Ace bandages to the kine only II the rance above the kinee are large, it may be necessary to hind the thigh for 2 to 3 weeks. When retrogued sclerosis is done the average hospital star a days if one, and 6 days if both sides are operated upon. If simple ligation has been done, the patient usually goes home the following day. The Ace bandages dor well fitting stocking.

are wom for from 8 to 12 weeks or until schools is complete, being removed only to bathe or when the patient is in bed. When scherols is complete the Ace bandages are discarded gradually. The legs will swell it thus is not done as vascular tractable to the Ace bandages as usual in the monthly and wear them until late aftermoon, when they are moved. If no swelling appears by bed time, to bandages are removed the next day in middite noon. Thus the boar of removal gradually becomes earlier until the patient goes wilked bandages entirely.

\*\*Particle removed the gradual of the patient goes wilked bandages entirely.\*\*

bandages entirely Postoperative injections: Where simple ligition has been done injections are beginn as soon at the wounds are well headed, i.e. ro to z days. Maitiple (three or four) punctures at one valit on the made as tolerated. I do not inject more than z cubic centimeters in one place or more than secuble centimeters at any one time.

cuble continueters at any one tune. If retrograde sciences has been done one should want at least a month before injecting any remaining veins. Frequently no further injection are necessar. It is my experience that many vein segments not initially thrombosed will become is without injection during the first 4 weeks after operation. The average patient, however seeds to injections to complete the obteration of the vances. I prefer to give an extra injection or two later than inject too much sciencing agent at the time of operation. Pratt originally used to to do cubic centimeters of solution. I use about our custer of this quantity.

## Comblications

I Postoperatus reactions A febrile response to retrograde scierous occurs depending on (s) the amount injected, (b) the size of the variety, set (c) whether both legs are done. On the scond and third days the temperature may reach 100.5 to 101 o degrees F Occasionally it is higher. This need occasion no alarm because better and more complete scierous occurs after increased feder response. However reaction higher than 101 degrees F is considered alboermal. Although I have noted no permanent ill effects, these patients

should be watched closely. I have seen several instances in which the temperature reached 105 degrees F on the third postoperative day and one instance in which it reached 107.4 degrees F All these complications were either in postphlebitic patients or in patients who showed signs of heightened vascular uritability. These patients were kept in bed with the legs elevated Papa verine 1/2 to 2 grains was given every 4 hours to lessen vascular spasm. Paravertebral novocam block was used in the more severe cases and extra fluids were administered Possibly these reactions could have been avoided with proper selection of cases for selerosis.

2 Femoral thrombosis I have observed no case of femoral thrombosus-a fact attributable to the exclusive use of local anesthena which makes

the patient immediately ambulatory

3 Hemorrhage No serious bleeding has been encountered following the use of silk transfixion of the saphenous stump Occasionally the femoral bandage becomes blood soaked during the period immediately after operation. This seepage of blood can always be controlled by pressure.

 Infection Avoidance of infection depends, I believe on (a) the use of a single puncture wound for anesthesia (b) delay of operation until dermatitis and other infections are cleared up (c) avoidance of injury to enlarged femoral lymph nodes during operation, (d) prevention of contam mation by proper dressing and the covering of the wound surface with sulfanilamide powder

5 Delayed healing of wounds Delayed healing of wounds frequently occurs without infection and only in the lower leg wounds. The lower the incision the more hable is healing to be slow Healing is frequently delayed about the ankle when incision has been made through edematous chronical ly inflamed skin. This difficulty is met with elevation warm socks, and suitable dressings

# Follow-up

The patients are seen at intervals after sclerosis is completed. The legs are inspected at the time the Ace bandages are discarded and again 3 months later After this I see them at intervals of 6 months. Any visible additional vances can then be injected. New vances occur and are not to be mistaken for recurrences. Occasionally recanali zation of certain channels occurs. This has been due usually to the presence of a blowout missed at the initial examination. Simple excision of the blowout followed by an injection or two remedies the situation SUMMARY

The origin of varicose veins is discussed and their anatomical types are enumerated together with the several types of bodily configuration in which varicose veins are most liable to occur Different methods of treatment and their indications are outlined. Injection of veins and operative technique are discussed in detail. Contra indications to the use of sclerosing solutions include (1) saphenous thrombophlebitis, (2) vasospastic disease of the lower extremities (3) obliterative peripheral vascular disease (4) abnormal reactivity to the test dose. Postoperative complications their avoidance and treatment are described. Analysis of cases and late results will be the subject of further communication when more time has elapsed.

# REFERENCES

- t Atlas, L. N. Surg Gyn. Obst. 1943 77 136-140 2. DUNLOF G. R. Ann. Surg. 1943 118 1924-1931 3. EGER S. A. and CASPER, S. L. J Am M. Ass., 1943
- 123 148-149.
- 4. LARSON R. A. and SMITH F L. Proc. Mayo Clin.
- 1943 18 400-403 5 MAYERSON H. S. LONG C. H. and GILER, E. J
- Surgery 1943 14 519-525
  6 Pearce, M B Surgery, 1943 14 901-914
  7 Peart G H. J Am. M. Ass., 1943 122 797-800.

# ADENOCARCINOMA CYLINDROMA TYPE OF THE PAROTID GLAND

# A Clinical and Pathologic Study of Twenty One Cases

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A a previous study by two of us (Dockerty and Mayo 4) it was pointed out that there occasionally arose in the submaxillary sali vary gland a type of neoplasm variously known as cylindroma adenocarcinoma cylindroma type or basal cell carcinoma with hyaline The incidence of this tumor in a large series of submaxillary glandular neoplasms, was approximately 20 per cent. Throughout the literature as well as in our own series this tumor had been confused with the ordinary type of mixed sa livars glandular neoplasms. In this group of

cylindromas recurrence was extremely high and metastasis frequent with more than 50 per cent of patients succumbing from the effects of widespread dissemination of the disease. Chinically cylindromas could not be distinguished from the group of mixed tumors although pain was a contrast ingly frequent symptom. Surgically the intiltra tive tendencies observed by the surgeon made him sometimes question a fresh tissue diagnosis of However in this precellular mixed tumor vious communication distinctive microscopic fea-

tures of cylindroma were presented and it was shown that the surgical pathologist familiar with the cellular pattern could render a real service m advising radical operative procedures when such a neoplasm was encountered.

More recent experiences (5) demonstrated that adenocarcinomas of the cylindroma type affecting the tongue and the parotid gland were also dangerous from the standpoint of metastasis. Mulligan, in a recent review reported instances of 12 metastasizing mixed tumors, many of which had been primary in the parotid gland. Interest ingly enough most of the illustrations in his article duplicated the microscopic appearance of

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respectively Methcal Corps, Army of the United States

The term cylindroms hence trusted in this paper appears
as an abbreviation for adenocarcinoms of the type cylindroms.

cylindroma in all major features. Since investgators still confuse mixed tumors with cybedromas and Bauer and Fox, on the basis of ; tumors, stated that cylindromas are genundy benign. It was thought advisable to conner a group of primary neoplasms of the paroud to ascertain whether or not cylindromas occurred there and, if so, whether or not their clinical behavior was that of their submaxillary come narts.

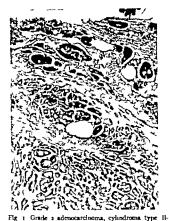
## MATERIALS AND METHODS

Material was available on 210 consecutive cases in which primary parotid neoplasms led been removed surgically at the Mayo Clinic be tween the vears 1028 and 1036 inclusive. This particular group of specimens was selected because a represented a series large enough to warrant conclusions as to the probable general moderce of parotid cylindromas and because it allowed ample time for a follow up in the cases occurring in the later years of the series.

Before any records were reviewed these 110 formalm-preserved tumors were carefully studied in gross detail special attention being paid to the features of size, color consistency presence or absence of encapsulation, amount of parotid ghadular tusue removed, presence of attached hunk nodes and so forth. Multiple blocks were cut look the turnors, the adjacent salivary gland, and regional lymph nodes when available. These blocks were placed in a 10 per cent solution of fresh formalin sectioned at a thickness of approvmately to microns and stained routinely with hematoxylin and cosin. Study of these sections brought to light 21 tumors which, although is many instances previously labeled atypical mind tumors, seemed to fulfill the criteria for a revied diagnosis of adenocarcinoma of the cylindrom type. The present report deals with the clinical and pathologic details of this group of 21 cases

# PATHOLOGIC DATA

Gross features In 19 cases the material vas such as to suggest that total or subtotal removal of the tumor had been performed and in a instance



lustrating resemblance to basal cell carcinoma. The honey combed plogs of malgrant cells are distinctive, as its absorbe hyaline stroms. The so-called capsule shown in the upper portion of the photomicrograph is cartenively in-vaded by malgrant cells (hematoxylin and cosin X44)

only a small biopsy specimen was available for study All of the tumors were unilateral In 4 cases the entire parotid gland was attached to large neoplasms of an infiltrative type and in 2 additional instances the presence of attached mangnant appearing cervical nodes indicated that fairly extensive operations had been performed In 7 of the remaining 17 cases the tumor appeared in the form of single or multiple grayish white encapsulated nodules. Rarely could the capsule be separated with ease from the underlying tumor tissue. Vonencapsulated examples always dem onstrated invasion of attached parotid glandular assue or the surrounding adipose connective tissue and portions of striated muscle which were occasionally removed with the operative specimen In I case an attached portion of the mandibular ramus was grossly invaded by neoplastic tissue

Microscopic features: The microscopic appear ance of these tumors differed in no essential respect from that detailed in a previous study (Figs. 1 to 6). The general architecture was that of islands and strands of small dark-staining cells with hyperchromatic nucles. Many of the units demonstrated central hone-combing with clear.

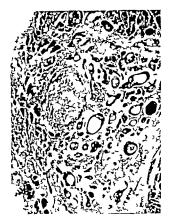


Fig 2 Grade 2 adenocarcinoma, cylindroma type il instrating again the basic architecture in addition to the phenomenon of perineural invasion by carcinoma cells (hematoxylin and coain X44)

spaces which in some instances were filled with hyaline substance, in others were occupied by globules of material which stained positively for mucus and in still others were empty stroma was in general hyaline. Infiltrative tend encies were pronounced the tumor capsule, the attached parotid glandular substances, the surrounding fat and so forth frequently demonstrat ing invading strands of tumor tissue running out from the parent growth Penneural involvement was observed in all 11 instances in which nerve fibers were found. Metaplasia to epithehum of a squamous type was noted in 2 tumors. All the other neoplasms were pure adenocarcinomas of the type cylindroma, 14 being of grade 2 and 7 of grade 1 malignancy according to the method of Broders. In 2 instances portions of the neoplasm demonstrated appearances somewhat typical of mixed tumor Previous experience had taught us that this group of 'intermediates ran the clinical course of cylindromas and accordingly they were included in the present series.

### CLINICAL DATA

Incidence The incidence of parotid adenocar cinomas of the cylindroma type was to per cent of the entire group Stein and Geschickter observed



Fig. 3. Grade 3 adenocarcinoma, cylindroma type, illustrating marked cellularity poor glandular formation and infiltration with splitting of the capsule. Enucleation in this case would have left behind multiple tumor secultings (bernatoxylin and coda: Xx6)

a 15 per cent incidence of this type. The corresponding figure for the submarillary salivary gland was 18.5 per cent according to Dockerty and Mayo (4)

Sex. Men and women were almost equally represented in this series, in keeping with the observation in the literature that salivary glandular neoplasms have no particular sex predilection.

Age The average age of the patients was 49 8 years with extremes of 32 years and 65 years.

Symptoms The commonest symptom related by the patients was the presence of a tumor with an incidence of roo per cent. The duration of the swelling varied from 6 months to 15 years with an average of about 7 years. It was thus impossible to judge on the beass of this symptom alone, the nature of the underlying pathologic process.

Half of the patients additionally complained of pain which was constant and localized in 2 in stances and intermittent and lanchasting in the remainder. Six patients had experienced extension of pain across the face, over the forehead or down into the neck, the character and distribution indicating irritation or actual invasion of a nerve by the tumor. In our experience pain was an unusual feature in connection with mixel sallwary.



Fig. 4. Grade 1 adenocarcinoma, cylindroma type is spate of good aciner formation and other evidence of cellular differentiation the infitrative propositions is evidence with the invasion of fat (hematraylia and cas-X41)

glandular neoplasms and its presence in patients suffering from primary perotid and submarihn swellings should make one alert to a possible or-

derlying adenocarcinoma of the cylindroma type On physical examination to tumors involved the right and 11 the left parotid gland. All times were unilateral. Location was generally described as being preauricular with certain tumors varying in occupying a high or a low position. The aver age estimated size was 4.5 centimeters with vanations from 1 to 7 centimeters. Whereas 10 of the tumors were somewhat movable, resembling mixed tumor in this regard, the remainder set described as being fixed a feature suggesting the presence of infiltration. As pointed out previously local fixation of the tumor is an important aign in distinguishing adenocarcinoma of the oil indroma type from mixed tumors of the salivary glands. Partial or complete paralysis of the facel nerve was present in 25 per cent of the cases at the time of first examination at the clinic. Whereas a several instances it is possible that this paralysi follows the performance of a previous operation we feel on the basis of pathologic studies that it # most often brought about through perineural invasion of the seventh nerve.



Fig. 5. Grade 2 adenocarcinoma, cylindroma type. This neoplasm was "recurrent" and illustrates extensive invasion of structed muscle (hematoxylln and cosin ×44)

At operation only 39 per cent of the tumors were invested by anything which could be described as being a capsule, the remainder demon strating evidence of infiltration. It was estimated that complete excision was accomplished in 50 per cent of the cases. However, several of the cases in which the surgeon made a note regarding residual tumor tissue were instances in which previous operation had been performed and the neoplasm was listed as a recurrence.

# TREATMENT AND RESULTS

Treatment consisting of wide local excision alone or combined with postoperative therapy using roentgen rays was employed in 15 cases. Complete parotidectomy was performed 4 times for large neoplasms 1 of which represented a recurrence following a previous 'local operative procedure. In the 2 remaining instances biopsy followed by roentgen therapy was the thera peutle regimen dictated by the presence of an ir removable tumor mass. Fourteen of the patients received their first treatment at the Mayo Clinic. In 7 cases treatment institute elsewhere was con tinued at the clinic because of neoplasms which had recurred.

Follow-up studies are available on 20 of these 21 patients and the detailed results are given in

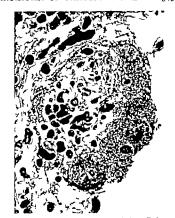


Fig 6 Grade 2 adenocarcinoma, of the cylindroma type, with the invasion of a lymph node (hematoxylin and cosin ×44)

Table I Although we have no necropsy data on the 10 patients who have died presumption that death was owing to the effects of carcinoma is af forded by roentgenograms positive for pulmonary metastasis in 5 of the group and of cervical nodal metastasis in 2 additional cases. The 5 patients who are living without any evidence of recurrence represent a disappointingly small group (25 per cent) The 2 deaths and the 2 recurrences in the group subjected to total parotidectomy make a poor showing for an operation of such magnitude. However these 4 patients were suffering from very large infiltrating neoplasms. Paralysis of the facial nerve was present in 25 per cent of the pa tients on their first admission. It developed in an additional 43 per cent at a time following opera tion, which indicated a causation based on infil tration by recurrent tumor in all except the 3 cases in which the nerve was purposely sacrificed in the operative attempt to eradicate large tumors.

### COMMENT

Although adenocarcinoma of the cylindroma type occurs in all locations which provide the tissue of origin for mixed tumors of the salivary glandular type it is our firm opinion that there is no justification for including the two types within the same category. Histogenetically mixed tu

TABLE L.—RESULTS OF TREATMENT IN CASES OF ADENOCARCINOMA CYLINDROMA TYPE OF THE PAROTTE OF AND

Свое	Trestment	Frank results	Carre	Percent
-	Pallato -ray	Dead in g years	-	Tercent
	Palletive ra and	Dead in 1 years		
	Local cacteon	Dead 5 years		
_	Local encrean and redum	Deed to 5 years		
	Lecal currion and ray	Dead m 5 years		
•	Custery exchaon and radram	Dead in 5 years		
7	Paretidectumy and ray	Dead in 5 years		
8	Parotedectomy -ray and radium	Dead to 1 years		
	Tetal cases (dred to 5	) <b>00</b> .78)	•	*
	Local excelon and -ray	Dead in 3 years		_
	Lecal excreton and may	Dead in 6)4 years		
_	Total cases (dead after	_		
	Local ruculon and radiena	Living 5 years recurrences	_	
	Parotidectomy and ray	Living 7 cars 6 recurrences		
3	Local escayon and radium	Living 7 years Last recurrence years ago		
ц	Parotadectomy and my	Living 5 years recurrences		
Total cases (hwag with repeated recurrences)				<b>30</b>
3	Local epution	Living 13 years (Status malnows)		-
rs	Local escrete	Lettag 7 3 cars An recurrences		
7	Local escanon and radium	Living 7 years No recurrences		
•	Local escence and radium	Living 8 years No recurrences	Ì	
	Local escenos, radeus and ray	Leving 10 years N recurrences		
20	Local recessors, radients and a-cey	Liveng 14 sairs No recurrences	_	
	Total cases ( Ithout re	CELLABORA)		- 5

mora arise from the epithelal cells of the salivary and lacrimal glands and also from mucous gland-ular elements of the lip tongue, pulate, larynx, and trachen. The tumors are well differentiated, often reproducing in fair detail the double layer ing of epithelium which characterizes the appear ance of a normal salivary duct. A cartilage-like stroma is typically encountered. In adenocard norma of the cylindroma type ducts lined by double layers of epithelai cells are lacking the appearance being that of dark-staining house combed epithelail plugs. This may indicate as

suggested by Bauer and Fox, a derivation from the basal basket, regenerative or "mvo-epithein" layers of the glands and ductor of origin. Curlaginous stromal changes are not occurred by hyalineation of the stroma is of frequent over

Clinically Tocation and duration are intures which in a given case are by no nean disnostic of 9 indromas as opposed to murel time. The clinical locidence of pain, however was go per cent in our group of cylindromas. In series of submanillary neopleams pain had as is either of 70 per cent as opposed to a sope red incidence as a symptom of maxed tumor & cordingly we feel that pain, especially of a shape radiating nature is of importance in differential clinical disposass. Of parallel significance wastefinding of fixation which in our expenses was noteworthy feature of cylindromas.

At surmoal exploration cylindromas were found to be infiltrative in more than half of the cases and rarely in these cases was the surgeon satisfied that he had completely eradicated the days. That his estimate was correct is attested by a recorence rate of 75 per cent about three times the incidence for recurrence of mixed tumors (1) The question is therefore raised whether or not more radical surgical measures should not be under taken for this more malignant cylindroma group To most surgeons the mere mention of paretdectomy calls up at once the specter of a patent with severe facial polsy. However, the analysis this series reveals that almost one third of the prtients had partial or complete paralysis of the homolateral facial nerve at the time of admissor and this incidence reached two-thirds at the find analysis. That this figure is three or four times a great as the corresponding one encountered amorg patients operated on for mixed tumor (1) kno strong support to our pathologic observation that permeural involvement by tumor tissue rather than surgical trauma had been the factor responsble for the paralysis.

Admittedly if paralysis, complete or more plete, of the facial nerve exists preoperatively a is due to the perineural invasion or pressure of the

If paralysis develops immediately after operation it is due to surgical interference with the nerve. This paralysis may be partial or complete. If it is partial it is usually due to tensoo of stretching of the nerve and slowly improves. If it complete rumediately the paralysis of the entire is likely to be surgical and permanent. In a small percentage of cases, bowever complete paralysis may become partial and m a much small.

number the patient may completely recover from

Paralysis developing a month or more after surgical resection can be safely attributed to in complete eradication of the pathologic process and continued extension by infiltrating involvement

Bailey has performed total parotidectomy for 7 parotid tumors with resultant palsy of the seventh nerve in 1 instance only demonstrating thereby that surgical 'interference with the nerve can at least occasionally be avoided 1. In the 4 cases in which total parotidectomy was done in the present series the facial nerve had to be sacrificed because of large infiltrating neoplasms. Subsequent recurrence in all 4 cases and death in 2 of them in dicated to us merely that the operation was too late rather than too little. It seems logical to assume that since resection of the gland although usually effective in the treatment of mixed tu more is followed in the cylindroma group by a 75 per cent incidence of recurrence, procedures at least approaching total parotidectomy should here be given a fair trial. We further feel that block dissection of cervical nodes on the in volved aide should be senously considered. In this regard as mentioned in the foregoing the surgical pathologist familiar with the appearance of these tumors in fresh frozen sections can render a real service to his surgical colleagues.

While therapy with roentgen rays did not in the present series have any pronounced effect in the prevention or control of recurrences we feel that its possible benefits should never be denied to any patient suffering from this serious form of cancer

## SUMMARY AND CONCLUSIONS

- I Ten per cent of a series of consecutive pri mary parotid neoplasms appeared to be adeno-
- All Wherter showed that the bonnan purotic gland consist of larger more feed and smaller deep lobe onesity distinct and readily segments. The feed and smaller deep lobe onesity distinct and readily segments. The two lobes if young the property of the sectian justachia substance. The two lobes if young they are labeled the state of the property of the feed of the property of the feed of the property of the feed of the f

carcinomas of the type cylindroma so classified because of a distinctive microscopic pattern

- 2 This group of 21 cases was characterized clinically by the presence of sharp radiating pain and local fixation of tumor in 40 per cent features unusual in connection with other primary neoplasms of this location. Partial or complete pa ralysis of the facial nerve was also a contrastingly common finding
- 3 Surgically the tumors were generally more infiltrative than encapsulated and application of the principle of 'wide local excision' prevented recurrences in 5 of 21 cases.
- 4. Pathologically the appearance of dark staining epithelial islands and strands with cen tral honeycombing in a hyaline stroma was diag nostic. Epithelial mucus was sometimes present Infiltrative tendencies were pronounced with a special predilection for invasion of nerve sheaths.
- 5 Eight of the 20 traced patients succumbed within 5 years to the effects of metastasis, 5 with evidence of pulmonary spread. Two died more than 5 years after operation. Four of the remaining to are suffering from inoperable (?) recurrences
- 6 Solid tumors of the parotid gland should be assumed to be malignant until proved otherwise.
- 7 It is suggested that more radical surgical procedures will have to be done in order to obtain better results in the treatment of this form of neoplasm

# REFERENCES

- BAILEY HAMILTON Brit. J Surg 1941 28 337 346 BAUER, W H and Fox, R. A. Arch. Path. 1945
- 30 705-102
  3. DDC, C R. Thesis, University of Minnesota Graduate
- School 1940
  4. DOCKERTY M B and MAYO C W Surg Gyn.
- Obst., 1943 74 1033-1045 Idem Surgery 2043, 13.416-422 McWHORTER G L. Anst. Rec. 19 7 12 49-154.
- 7 MULLICAN R. M Arch. Path., 1943 35 357-365 8. STEIN INVIN and GESCHICKTER C F Arch. Surg 1934, 28.492-526

### A CLINICAL STUDY OF EARLY POSTOPERATIVE AMBUI ATION IN GYNECOLOGY

PAUL F STEINHART M D Les Angeles, California

ITH surgical e helency at its present level, we should not be satisfied merely with recovery from a surgical operation but we should know as Matas once stated how the patient has recovered, to what extent she has been restored to her anatomical and functional integrity to what extent she has been cured and made fit to return to her normal life and occupation how long it has taken her fully to recover after the operation and what are the end-results.

There is no excuse for leaving a single stone unitarities to suffering shorten the convalencence, and eliminate the economic waste incident to surgery on human beings (20) and, if early postoperative ambiliation is an added means toward this end, then its use should be more widely adouted.

A comparison of the relative ments of early ambulation with those of late ambulation will be made in the following report. This presentation may in effect, along with similar preceding reports (17 az 23 25 27) remove prejudice and add to the surgeon's postoperative therapeutic armamentarium. Of course, there are limitations and although this sense was consecutively treated by early ambulation, the surgeon's judgment should individualize each case. However the results demonstrate that fear of early ambulation is in the majority of cases, unwarranted.

#### PRESENTATION OF DATA

Fifty four consecutive cases are herewith ducused. The first 17 patients were maintained on the conservative regumen of late ambulation the following 37 patients received early postoperative ambulation. No attempt was made to collect additional cases of patients treated by the old regumen because it was desired to maintain the factor of the operator constant. Because of this fact no attempt will be made to quote percent ages only a relative compension will be made.

Since the original compilation of this report, several additional patients were also treated by early postoperative ambulation with apparently

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similar results, but are not herewith included because of insufficient follow-up

All patients were charity cases, from near sections of the State of Nebraska. All patient received adequate preoperative care. Patient with low blood counts and hemogloim value aceived adequate transfusions.

The technique of operation was constant is both series.

Of the patients ambulated early  $\gamma$  had Pionenstiel incisions, the remainder had make medians. All of the patients ambulated his had midding incurous.

In all total abdommal hysterectomies, 5 press of sulfathiazole powder or crystals was introduced into the abdomen prophylactically. In other cases, only in the presence of old infection was saifa sulfa powder or crystals used.

Abdominal closure was made by lavest, the pentoneum was closed by a continuous stick of No. 0 or No. 1 plain catgot the fasca was done by a continuous stitch of No. 0 or No. 1 thrust catgot from each angle to the middle of the cision the skin was closed with fine dermal instructed vertical mattress satures. No tensor satures were used (except in the case of spaics because of obesity—weight 245 pound—on what an incidental incisional ventral hemiocraphy to performed).

Spinal anesthesia was used in the majorty of cases cyclopropane and ether were used so when spinal anesthesia was refused. In a vojfew cases, the spinal anesthesia was refused. In a vojfew cases, the spinal anesthesia was implemented with cyclopropane and ether near the dose of the operation. One elderily patient aged 74 years, are operated upon under local anesthesia of 1 prominovocaus for the removal of a very large oration cyst a multillocular serious cystademost.

There were no postoperative dietary returning in either senes. Diet was taken at tolentel leguids, soft or regular. Intravenous fulls were rarely administered immediately postoperative and this treatment was carried out only if operation was extensive. Fluids were sufficient taken orally.

A retention eatheter attached to a bottle six used after all plastic operations and ragual hysterectomies. In the patients ambulated early

TABLE I.-EARLY AMBULATION

Type of operation	Pathology	\0.0 <b>***</b>		
Total hysterectomy g casts	Fibronyonala uteri Highly malignant surcona f t ray Adenocarchoma of terus Uteruse bleeding, cause suknown			
Subtotal hysterectomy 6 cases	Fibromyomata t ri Chronic prive inflammatory change	4		
Laparotomy 3 cases (lacidental ppendectomy as doos in 5 cases)	Simple cystic ovaries Bal polycystic ovaries Multinomian serons cystade nonas of ovaries Rt tubo-ovarian abscess and perhapperakellis Retroverted nisri Scarred appendix and appendix venicalom	4 J		
Vaginal hysterectomy and osipopermeoplasty 3 cases	F bronzyomata uteri with cystorectocyle Prolapmus teri (=-g*) with cystorectocyle ( patient had fibronzyomata uteri)			
Plastic operation y cases (Includes urethroplasty and Manchester opera- tion)	Marked cystorectocsie Marked cystorectocsie fol- lowing total hysterectomy Urethroccie and rectocsie Prolapse (*) of steron with elonated cervis with currictis-cystorectocsie	4		
Combined abdominal and plastic operation cases	Marked cystorestocrie—the degrees prolapse and retroverted—terms Lacerated pelvic floor with chronic cervicitie and retroverted ateros			
Low carvical cetaman metion	Indication, previous coveries sections			

\*Uniateral or bilateral salpingo-oophorectoray or incidental appendectoray were performed on some of these patients

CES

the catheter was kept in for the first 24 hours (except for 2 cases, one a vaginal hysterectom) performed on an obese patient weighing 217 pounds and the other a urethroplasty in which the catheter was kept in for 48 hours). In the patients ambulated late the retention catheter was used for 72 to 96 hours. In 3 total abdominal hysterectomies (2 in the early ambulated series and 1 in the late ambulated series) because some difficulty was encountered in the dissection of the bladder from the cervu a retention catheter attached to a bottle was used for the first 24 hours. In all other cases patients were cathetenized only when necessary

A study of the patients treated revealed the following salient features

The age range of the patients treated by early ambulation was from 15 to 74 years of those treated by late ambulation 30 to 70 years. The mean age of those ambulated early was 41 2 years of those ambulated late 52 1 years. The weight range of the patients ambulated early was 110 to 225 pounds of the patients ambulated late

#### TABLE II - LATE AMBULATION

Pathology	N	ara
Fibromyomata uteri Adenocarchoma of steres Ut rine bleeding, cause unknown		
Chronic pelvic inflammatory disease Uterine bleeding came maknews Endometricula of ovary with t rine bleeding, cause maknews Adenocurtnoms of svaries ith adenomyods at ri		
Bil. pyomipinx		
Prolapses uterl s-3 degrees the cystorectocele (one case of adenomyosis uterl) Complet procidentia uterl with marked cysto- rectocale		<b>.</b>
Marked cystorectocels ( patients with elongated cervices ith cervicius requiring amountation) Urethrocels and rectocels		
	Fibromyomata steri Adericarchosma of steres I Adericarchosma of starty with I title bleeding cause Adenocarchosma of starty with I title bleeding cause Adenocarchosma of startie I A adenocarchosma of startie I Adenocarchosma	Fibromyomata uteri Adenoarchiomas of uterus Undersoarchiomas of uterus Undersoarchiomas of uterus Undersoarchiomas Chouck pelvic inflammatory Chouck pelvic inflammatory Undersoarchiomas of ovary with the bleeding cause Endoarchiomas of swaries the adenoarchiomas of swaries the adenoarchiomas of swaries the adenoarchiomas of swaries the demongrads at ri Bill, prosalplax  Prolapses uteri = 3 degrees the cyntorectoric (non tarrity of the control of the control and the control of the control and the control of the control and the control of the control of the control and the control of th

\*Unilateral or bilateral sulphage-cophorectomy or incidental appendentomy were performed on some of these patients.

112 to 230 pounds. The nutritional status of the patients in both series was approximately the same.

In the early ambulation series, there were 2 patients with hypertensive heart disease 1 with rheumatic heart disease 2 with positive serology (Mazzini) and 1 with chronic bronchitis. In the late ambulation series there were 3 patients with hypertensive heart disease and 2 with diabetes mellitims.

Wound healing was not affected by the positive serology or the diabetes mellitus in either series.

The surgery performed on the patients ambulated early included 5 total abdominal hysterectomies 6 subtotal hysterectomies 13 laparot omies for surgery other than hysterectomy 3 vaginal hysterectomies 7 plastic operations 2 combined abdominal and plastic operations 1 cesarian section (this case is included because of the abdominal surgery entailed) For the pathology associated with these cases see Table I

The surgery performed on the patients ambulated late included 3 total abdominal hysterectomies 1 laparot omy for surgery other than hysterectomy 4 vagnal hysterectomes 5 plastic operations. For the pathology associated with these cases see Table II.

The patients who were ambulated early wore tight abdominal binders and, in the majority of instances, got up in a chair on the first postopera

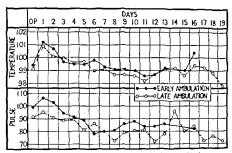


Fig A composite graph of the temperatures and pulse rates of both sensa.

tive day with bathroom privileges. A few be cause of hesitation and fear dangled on the first day (8 out of 37 patients). All patients were up and about on the second day. Two patients who had undergone vaginal hysterectomies and 1 who had undergone a urethroplasty were ambulated on the second day because a retention catheter was used for the first 48 hours. Early ambulation was not insisted on but was encouraged. This series includes 4 patients, s of whom ambulated themselves on the third day 2 of whom ambulated themselves on the fourth day. The majority of nationts who were ambulated late got up in a chair on the seventh or eighth day I patient got up on the sixth day I on the tenth day and I on the twelfth day

A composite graph of the temperatures and pulse rates of both series (Fig r) such as was presented by Powers in his report, shows relatively little significant changes due to early ambulation. Like that of Powers, these were plotted by averaging the highest levels recorded for every patient on each day and thus represent maximal elevations during the convolucions therefore.

Postoperative invalidation, both psychical and physical, was markedly reduced in the patients who were ambulated early. There was less apprehension on the part of the patients and the lamly, as to the patients condition and prognous. There was a notable decrease of the usual postoperative complaints on the part of the patient. Nursing care requirements were markedly reduced.

The necessity for catheterization of patients with abdominal surgery occurred for the most

part on the operative day and the number of teents requiring catheterisation was relatively its same in both series. Of the patients ambeted early 10 of the 35 abdominal cases required alterization and this on the operative day. Or patient only required a second catheterizates as the first postoperative day. Of those smbollate, 3 of the 8 abdominal patients report active terrization and this was necessary or in operative day only

All the patients on whom plastic operations and vaginal hysterectomies were done, whether atbulated early or late, showed the same relative frequency of catheterization following removal of the retention on theter Of the patients ambulated early 2 out of 12 required catheterization once; the patients ambulated late, r out of 9 required catheterization once. The early ambulated patients, however emptied their bladders port completely suggesting that in these types operation there was an earlier return of hinder tonicity with early ambulation Although a studof residual urine was not carned out in all case due to a shortage of nurses, the findings in the cases in which this study was done seemed to confirm this fact. A more complete study of all the cases, made by averaging the lowest quantities of urine voided, the highest quantities voided and the frequency of voiding for the first 3 days lolowing removal of the retention catheter revoled that the patients who were ambulated can't vonded larger quantities and less frequently (Table III)

In both series there were a few patients sho were able to move their bowels without the ail of

#### STEINHART enema however the incidence was greater ong those who were ambulated early (14 of the

patients ambulated early compared with 2 of 17 patients ambulated late)

There were no cases of abdominal distention in e patients who were ambulated early and only x se of moderate distention in the patients who

The requirements of sedation during the opera we day were comparatively the same in both After early ambulation seciation was enes.

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The number of hospital days here reported is arely required not necessarily a true indication of the hospital days required for convalescence. Since patients came from many sections of the state and in many cases were required to travel great distances, discharge from the hospital was made according to the convenience of the patient and not necessarily at the time when the patient was physically able. Some patients stayed as long as 2 to 5 days beyond the time of discharge Because this factor was constant in both series, the relative number of hospital days saved is still quite evident. The average number of hospital days required by the patients who were ambulated early was 8.72 days as compared with 13 94 days required by the pa tients who were ambulated late. Early ambulation therefore, saved an average of 5 22 hospital days per case. A comparison of the average number of hospital days required according to the type of operation performed is given in Tables IV and V • ĸ

The patients ambulated early developed the following postoperative complications plained fever 2 cases acute bronchitis, 1 case phiebitus, I case hematoms in incision I case.

Unexplained fever occurred during the post operative course of 2 patients, one upon whom a vaginal hysterectomy had been performed and the other a plastic operation Physical examina tion and laboratory findings were negative in both CB 505.

Acute bronchitts occurred in a patient weighing 217 pounds, with known chronic bronchitis, on whom a vaginal hysterectomy was performed. The patient had a predisposing focus of infection and it is possible to conceive that early ambula tion in this very obese patient prevented the

possibility of bronchopneumonia. Phlebitis occurred in a patient on whom a urethroplasty was performed. Early ambulation in this patient was evidently insufficient prophy laxis against this attack of phlebitis. It may be noted that this patient had a milk leg in the opposite leg 20 years ago following a normal delivery

	TABLE	111	
	Mary Control of the last of th	Highest quan-	Frequency
	Lowest qua tity	tity washed	day
Patients	October	3 (100 c.c.)	
Ambulated early	\$ ( 50 cc.)	(900 )	<u></u>
Ambulated late	4 ( 50 CE)	i occurr	d in a Pa

A hematoma in an incision occurred in a pa tient who had a Gilliam suspension. The hema toma was at the level where the round ligaments were anchored to the fascia and evidenced itself by a I inch gape of the incision on the sixth post operative day While this hematoma may be attributed to early ambulation it is concervable that a small unrecognized bleeder may have been produced at the time of operation in one of the perforations of the fascia and rech muscles through which the round ligaments were drawn.

The patients ambulated late developed only I poetoperative complication I case of unexplained lever Unexplained fever occurred after operation in a patient who had undergone a vaginal hysterectomy Physical examination and laboratory

findings were negative.

on these patients revealed that the convalescent period at home was much less for those patients who were ambulated early Of the patients ambulated early 8 were able to resume their normal activities immediately after leaving the hospital of those who were ambulated late only I was able to do so The average con valescent period at home required by the patients who were ambulated early was 3 87 weeks, com pared with 6 5 weeks required by those who were ambulated late. The average total convalescent period required by those who were ambulated early was therefore 3,3 weeks less than that required by those ambulated late. The duration of convalescence according to type of operation is shown in Tables IV and V

A follow up of both series, over a period of 6 to 8 months, has revealed no disruption of wounds, no incisional ventral hernins, no recur rent cystorectoceles, no prolapse of the vault of the vagina following vaginal hysterectomies.

DISCUSSION The above data reveal certain obvious clinical advantages in early postoperative ambulation. A study of the etrology and pathology of post operative pneumonia atelectasis, embolism in farcts, phlebothrombosis, etc. indicates that enrly ambulation also offers advantages in the prophylaxis of these conditions.

With the patient on her back following surgery the stage is set for many hours of recumbency with

TABLE IV -FARLY AMBULATION

Type of operation	filospit I days (Averages) Days	Compulerctut peturi house (Average) Days	Tetal curs burns perset Days
*Tetal hystarcctamy	9.2	29.4 (4 World)	30 (16 meta)
*Subtatal hystorectomy	14	S (4 Wecks)	pó 6 (y so weske)
Laparotamies	7	g #6 (2.18 weeks)	er er (cer renta)
Lagrani hysterictomy and colpopertisesplanty		pra (raa <del>wed</del> a)	da y (875 weeks)
**Plastic operations		as (s. weeks)	44 (5 al weeks)
Combined abdominal and plastic operations	9.5	sl. (4 vods)	27.5 (121 mail)
Lew cervical couries section	•	SS- (S. Wooks)	44 # 46 waring
All types averaged in tota	87	27 04 (3 E7 Works)	35 St-(5 Perfei)

<sup>\*</sup>Uninteral et tilatural telephage-explorectomy of incidental appendictomy were performed an some of these cases.

(Number of imprital days reverted are not necessary the actual number of inopidal days required—frequent inner transportation difficiler case completed, reporting 1 days is not everaged.

shallow breathing (4, 25) There us pooling of the tracheobroachia sceretions in the finer ramifications of the broachial tree and very often a discincination to cough due to pain. This, in association with the limitation of the respiratory excursions, allows for an obstruction in the distal broachioles. The free dramage by which the lung is kept in an aseptic condition is interfered with the air distal to the obstruction is absorbed the corresponding lobules collapse and in the occluded area, with a predisposing infection, a mild pneumonia may develop

The increased long expansion afforded by the exercise of early ambulation would no doubt aid in the prevention of the pooling and stasts of the tracheobronchial secretions, and hence early ambulation should be definite prophylaxis against such pulmonary complications.

The metabolism (7) and muscle tone of the recumbent patient are low. There is a decrease in the volume of flow in all the versels of the body. The venous pressure is low and the caliber of the

veins, especially in the abdomen, pelvis, and lesis much smaller than when sitting up. Only when the patient is sitting or standing are these vers constantly dilated. Frykholm suggested that collapsed veins may have endothelial damp. predisposing to later thrombous. Vens, which are compressed and empty due to pressure of the legs against the bed as suggested by Dock, and easily suffer endothelial damage and begin to thrombose while nearly empty. Dock futher pointed out that phiebothromboris may begin in the venules of the muscles and subcutis, or is the pelvic venous plexuses where complete stars is possible. The formation of large clots propagated far along the system is made possible by prolonged recumbency The dislocument of data with the formation of emboh is effected she after this prolonged recumbency there is a saide ruse of venous presente such as is produced by getting out of bed or straining on a bed pan-

Pulmonary embolism has always been a but bear of surgery especially in gynecology and

TABLE V-LATE AMBULATION

Type of operation	†Hospatal days (Average) Days	Convalencest period home (Average) Days	Total correlated paried Days
*Total hysteretterny	, ,	y 6 (re-65 urceks)	Sy 60 (ze 3 weeks)
Subtotal kystosectomy	3	•	
Laparotomias		så (4 <del>veds</del> )	
\ aginal hysterectonies and colpoperasoplasty	u 5	60 fz ( \$ 64 weeks)	73 67 (10 55 weeks)
Plantic operations	•	yé ( j erks)	# 1
All types averaged in total	194	45.5 (6 weeks)	19 44 ( 8 40 modes)

Uniform of baseful days recorded un not securately the accountment of baseful days required from the control of the control of

obstitutes. It may occur suddenly in uncompile cated cases of patients who have progressed satisfactorily. The patient is allowed up out of bed for the first time on the seventh day or later and like a bolt out of the blue, a fatal embolism occurs. Fortunately this accident is not very frequent however when it does occur it is grim tracedy.

Since muscular activity increases the venous circulation of the lower extremities, walking would prevent stass in the venules of the muscles also since sitting or standing increases the caliber of the pelvic venus, stasis in the pelvic vessels associated with recumbency is thus removed. The prophylaus afforded by early postoperative ambulation against such postoperative accidents.

should be quite apparent

Early postoperative ambulation in plastic operations and vaginal hysterectomies causes no additional pain or discomfort. Patients who were ambulated early felt much more comfortable and invalidism was greatly decreased. Pain on sitting in a chair is avoided by the use of an inflated rubber cushion ring.

There may be some pain in the incusional area of abdominal operations on the initial attempt to arise, but this quickly subsides. The patients then feel more comfortable and from then on they have very few if any complaints about pain Patients who had previous laparotomies in which they had been treated by the conservative regimen of late ambulation themselves volunteered the information that with early ambulation they had less discomfort and very little pain

It has already been stated that a follow up of the patients treated by early postoperative am bulation in this report has revealed no wound disruptions, no incisional ventral hermas, no recurrent cystorectoiceles, no prolapse of the vault of the vagina following vaginal hysterectomies and a study of the etology of these conditions suggests up reason why early postoperative ambulation should result in a greater incidence of these conditions.

The breakdown of plastic operations or the prolapse of the vault of the vagina following vaginal hysterectomies may be entirely attributed to poor surgery or poor tissue, fascal etc. or both. Recurrent cystoceles or prolapse of the vault of the vagina following vaginal hysterectomies are seen frequently in patients who were ambulated late. Anatomically it is not conceivable that walking or atting produces any significant stress or strain on the fascal supports of the bladder or rectum or the uterosceral and round ligaments which are used to support the vault of the vagina.

following vaginal hysterectomies. A cough or a sneze in bed would cause more strain by the increased intra abdominal pressure thereby produced than would walking or aiting

R A Cutting wisely stated that if unusual strains were a frequent cause of wound rupture the condition might well be expected to occur with a far greater degree of frequency than it does, because even though unusual strain be construed rather harrowly such strains occur far more frequently than wound rupture.

Brettauer in 1899 was the first to describe wound disruption in the American literature, with a report of 3 cases. Several large series (3 8 10 II IZ 21 24 28 29) have since then been reported. One is impressed with the variety of opinions as to etiology. There are many prediaposing and precipitating factors suggested as being responsible for wound disruption.

The salient predisposing causes as evidenced by the many reports in the literature include the following obesity or asthenia (28) malnutrition (28) hypoproteinemia (13 15 26 28 30), avita minosis (13 28) low ascorbic acid level (13 28 32) dehydration (28) diabetes mellitus and similar disturbances of sugar metabolism (32) malignancy (28) especially if previous radiation has been given and presence of acute or chronic pelvic inflammation (28)

The technique of wound closure is of obvious importance and various factors have been emphastized Many have stressed in the technique of wound closure the significance with respect to the careless hemostasis (14 16) too tight suture of the fascia (6) the graping of large masses of tissue in ligatures (18) excessive use of catgut (1)

The salient precipitating factors, as evidenced by the many studies of evisceration are all conditions which increase the intra abdominal pressure (11 12 24 28 29) These include abdominal distention, with severe coupling or persistent emeals, hiccoughing etc.

The etiology (6 18, 19) of postopernitive in cisional ventral herma is similar to that of wound disruption. Here, too poor operative technique and postoperative complications, such as abdomnal distention associated with vomiting coughing and hiccoughing are stressed

Considering all these factors, it is difficult to conceive that wound disruption or incisonal herma should occur more frequently with early postoperative ambulation than those treated by late ambulation. Predisposing causes of wound disruption or incisional ventral herma such as malnutrition. hypoproteinemia avitaminosis

scurvy (low asorbic acid level) dehydration and so in should be eliminated by good preoperative care, a recognized necessity for all surgery. The importance of good operative technique in abdominal closure is taken for granted whether the patient is ambulated early or late. Should abdominal distention occur as a postoperative complication the surgeon's judgment should of necessity forbid the continuation of early post operative ambulation, if already instituted, and appropriate measures should be taken to treat the cause of the distention.

It is interesting to note that in many reports in the literature, the incidence of wound disruption appears to be approximately the same as the incidence of fatal pulmonary embolism following surgery In a study of wound disruption Schmitz and Beaton found an incidence of 0.18 per cent. Glenn and Moore (10) o 66 per cent Norms, o 5 per cent. Singleton and Blocker 0.67 per cent. Barker et al. in a statistical study of pulmonary embolium, found that the incidence of fatal pulmonary emboli, associated with major gynecological surgery ranged from 0 53 to 0.73 per cent. The mortality rate of wound disruption, how ever appears to be at least 50 per cent less than that of pulmonary embolism. Bowen found that the mortality rate of wound disruption ranged from 16 to 75 per cent. The average reported mortality rate of wound disruption according to Schmitz and Beaton is 34.8 per cent. It seems logical, therefore, to employ early postoperative ambulation as prophylaxis against pulmonary emboham in spite of fear of wound disruption. which is unwarranted as has been indicated.

#### YEARUS

Fifty four consecutive cases are reported the first 17 cases were maintained on the conservative regimen of late ambulation, the following 37 cases in the group received early postoperative ambulation.

- The temperature and pulse rates showed relatively little significant change due to early ambulation.
- Postoperative invalidism, both psychical and physical, was markedly reduced in those patients ambulated early
- 3 The nursing care requirements were mark edly reduced.
- 4. No significant difference was noted in the requirements of postoperative cathetensation in abdomunal cases. In plastic operations and vaginal hysterectomies, however an earlier return of bladder tonicity was suggestive in those patients ambulated early

- 5 Those patients ambulated early were relatively more able to move their bowels without the and of an enema.
- 6 Sedation was rarely required after patients were ambulated early
- 7 The average number of hospital days required by the patients ambulated early wn δη days, by those ambulated late 13.94 days, the saving an average of 5.22 hospital days per ptient for those who were ambulated early
- 8. The average convalencent period at loss required by the patients ambulated early was if weeks by those ambulated late 65 weeks. The average total convalencent period required those who were ambulated early was 3.3 well those who were ambulated early was 3.3 well less than that required by those ambulated let.
- 9. A study of the etiology and pathology of postoperative pneumonia, atelectass, philothrombosis, embolarm, and infarcts indicate the early postoperative ambulation also offers at vantages in prophylaxis.
- To Pain and discomfort as a result of each postoperative ambulation were not in evidence this series. In fact, the patients who were and lated early had less pain and discomfort the those who were ambulated late.
- 17 Early postoperative ambulation in pairs operations and vaginal hysterectonies shock is sult in no greater incidence of recurrent cytodic prohapse of the vaginal walls following varieties. Anatomically there is no educate of added significant stress on the fastic alignmentors supports from early ambulation.
- 12 A study of wound disruption and incisonal hernia suggests that early postopeative ambettion should not in itself result in a greate is cidence of wound disruption and incidenal herni providing, of courte, the patient has received and preoperative care and the usual good opening technique.
- 13 Follow-up in this series revealed no wood disruptions, no incisonal hernias, no recursicystorectoceles, and no prolapse of the ragmivaults following vaginal hystrectomes.

#### CONCLUSIONS

Early postoperative ambulation in graceing reduces the usual postoperative irralidism, see psychically and physically and results in sea rapid convalencence. Gestrointestinal and sea det toolety may be increased. Very little, day redation in required after early ambulaton instituted. Nursing care is markedly reduced instituted. Nursing care is markedly reduced

There is a definite advantage in carly amountion as prophylaxis against postoperative post-

monia, atelectasis, phlebothrombosis embolism and infarcts. Early postoperative ambulation per se should in no way increase the incidence of wound disruption, postoperative incisional hernia, recurrent cystorectoceles following plastic operation or prolapse of the vaginal vault following varinal hysterectomies.

#### REFERENCES

 BARKER, N. W., NYOAARD K. K., WALTERS, W. and PRIESTLY J. T. Proc. Staff Meet. Mayo Clin. 1940. 15 769.

3 BOWEN, ARTHUR. Am. J Surg 1940, 47 3 10. 4. BOYD, WILLIAM. A Textbook of Pathology and ed

- Philadelphia Lea & Febiger 1934 5. BERTTAUER, J. Am. J. Obst., 1890, 14, 324. 6. CUTTING, R. A. Principles of Pre-operative and Post
- operative Treatment. New York Paul B Hoeber 1032 DOCK, WILLIAM, J.Am.M.Ass., 1944, 125 1083
- 8. FALLIS, L. S. Surgery, 1936, 1 523.
  9. FRYKHOLM, R. Surg Gyn. Obst. 1940, 71 307 10. GLEON F., and MOORE, S. W Surg. Gyn. Obst., 1937
- 65 16-22 11 Ibid., 1041 72 1041 1046
  12 HARTHELL, J B and WINFIELD J M Surg Gyn
- Obst. 1939, 68 585

  13 HARTELL, J B., WINNTELD J M and IRVIN J L.

  J.Am.M.Ass., 1941 116 669-674.

- 14. HEYD, C. G. Ann. Surg., 1934, 99 5 15 KOSTER, H., and SHAPIRO, A. Arch. Surg. 1940
- 41 723 720.
  16. LAHEY F. H. J.Am.M.Ass., 1927, 89 1735
  17. LEITHAUSER, D. J., and BERGO H. L. Arch. Surg
- 1941 42 1086-1093

  18. Mason, Robert L. Pre-operative and Post-operative Treatment. Philadelphia W B Saunders
- Co., 1937

  10 MARSON L.C. Surg Gyn. Obst. 1923 37 14.
  20. MATAS, RUDOLPH. Foreword to Principles of Pre-
- operative and Post-operative Treatment by Regi nald A. Cutting (6)
- 21 MELENRY F L., and Howes, E. L. Ann. Surg 1934
- 99 5 13 22. NELSON E. W., and COLLINS C G Surgery 1942, 12 100-114.
- NEWBURGER, BERNHARD Surgery 1943 14 142-154
- 23 Norris, James D. Surgery 1933, 5 715-787
  25 Powres, Johns D. Surgery 1930, 5 715-787
  25 Powres, John H. Jamman, 1944, 125 1079
  26 Rhouse, J. E. FLITCHIMA M. T. and PAMEIR
  L. M. Jamman, 1941, 118 21 25
  27 RICKLES, JULIAN A. Northwest M. 1943, 42 202
  28. SCHMIT, H. E. and BRATON J. H. Am. J. Obst.
- 1942 43 806-814.
- 20. SINGLETON A. D and BLOCKER, T G., Jr. J.Am
- M.Am., 1030, 112 122-127 30. Thompson W D RAVDIN, K. J and Frank J L.
- Arch Surg., 1938, 36-500.
  31 VON GRAFF ERWIN. Am J Obst., 1936, 3 754
  32 WOLFER J H. Surg Clin N America, 1940, 20

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#### EDITORIAL.

#### SURGERY Gynecology and Obstetrics

FRANKLIN H MARTIN Founder and Managing Editor 1905-1935

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MARCH, 1946

#### IPSILATERAL SPASTIC RECTUS ABDOMINIS IN A PURELY THORACIC WOUND

BSERVATIONS on wounds of the thorax within the first few hours after injury have yielded some inter esting side lights on these dancerous wounds. In one action resulting in 250 deaths on the battlefield 60 deaths or approximately 25 per cent were due to wounds involving mamly the chest. Death from chest wounds on the battlefield or at the forward dressing station occurs most frequently due to massive hemor rhage from injuries to the heart the aorta the vena cava the hilar vessels or even to the subclavian vessels running over the apex of the lung. If the wounded man survives the threat of immediate hemorrhage and can be transported to an evacuation hospital his chances for survival are greatly in creased but even here death from exsangua nation may still occur although in decreasing numbers as pooled universal group O blood

and massive transfusions are made as readly available as plasma

A second cause of early death is a tenion pneumothorax incident to a laceration of the lung or of a bronchus, which may open as the lung relaxes in expiration. The obvious dysones, the immobile but distended here thorax the resonance on percussion and absence of breath sounds, give clearest evidence of the need for prompt withdrawn of air but not infrequently the need for the continuous escape of air is unrecognized and death from resouratory and circulatory fallow occurs A patient who has had one aspiration for a tension pneumothorax with removal of apparently sufficient air to correct the mediastinal displacement must be under careful and repeated observation for the next 48 hours lest a recurrence of the pneumothorax be overlooked. The introduction of a needle or of a catheter into the chest for the continuous escape of air should not be approached with timidity even by surgeous inexperienced in thoracic work. If an under water seal or a flutter valve is also provided, one need have no hesitancy in producing such a temporary opening into the thoracs **cavity** 

A fascmating but poorly understood early observation in connection with wounds limited to the chest has been an accompanying abdominal wall rigidity usually unlateral, or casionally bilateral and often associated wit subcostal tenderness on palpation and recussion strongly suggesting an intra-abdominal injury. There is also obsence or marked reduced amplitude of excursion of the abdominal wall during respiration suggesting is immobile or spassic diaphragm or even as

underlying peritonitis Frequently these signs are present only in the early hours after in jury, they disappear spontaneously some times within 18 hours and they rarely persist nore than 48 to 72 hours In the first few hours after injury they may be so pronounced that one might easily be tempted to perform an abdominal exploration for a

Occasionally in association with through runtured viscus and through wounds of the lower right chest, the nght dlaphragm and dome of the liver may sustain an injury which is quite unsuspected before its disclosure at operation or at autopsy with a resulting rigidity of the abdominal wall and tenderness of the entire ibdomen due to the irritating effect of bile and blood in the perstoneal cavity

It is not uncommon of course, to find such abdominal spasticity and subcostal tender ness on the same side as a lower lobe pneu monia attributable to involvement of the imphragmatic pleura in the inflammatory process In the cases under discussion there was no injury to the diaphragm and no in flammation except that incident to blood in the pleural space. In one case autopsy served to illustrate the frequently observed phenomenon of a spastic abdomen associated ath injuries entirely limited to the chest

A number of nonfatal cases could be cited illustrating the effect upon the abdominal wall of purely thoracic injuries Conversely similar phenomena involving the uninjured chest, consecutive to wounds of the abdomen have also been ovserved What operator has not noted following a McBurney incision or a right rectus incision or a wound of the flank, a definite lag in respiration a limi tation in the excursions of the chest and diminished breath sounds on the side of the wound even with no evidence of bronchial obstruction or atelectasis to explain it?

In one instructive instance three observers independently concluded that a private with a large left flank wound draining feces through a tangential laceration of the colon had a left subphrenic abscess due to high fever diminished respirations faint breath sounds dullness suggesting a high diaphragm and tenderness on heavy percussion of the left lower chest When no pus was found on aspiration at several points the wound itself was widely opened, and a large piece of shrapnel and sequestrated bone were removed from a lumbar abscess followed by complete disappearance of all chest signs

A connecting link between the two serous lined cavities is the sympathetic chain but the mechanism whereby it acts is unknown due to our limited knowledge of the sym pathetic pathways and the direction of their impulses. The intercostal nerves may be part of a reflex arc capable of mediating pain ful stumuli from the site of injury and affect ing the abdominal wall innervated by them A third possible explanation lies in the irritating effect of free blood in the pleural space upon the panetal and diaphragmatic pleura and upon structures which are un The early accustomed to its presence disappearance of this effect may be the result of dilution of the blood through pleural weeping Whatever its explanation this highly interesting reciprocal relationship between the two major serous lined cavities of the body and how it is mediated should yield

to carefully planned experimentation Surgeons generally should be aware that in the presence of a chest wound, a spastic tender abdomen does not necessarily require a laparotomy and if clinical and x ray studies definitely disclose that the missile in its line of flight did not traverse the abdomen or its parietes one may safely disregard the abdom inal signs.

#### THE SURGEON'S LIBRARY

#### REVIEWS OF NEW BOOKS

THE book by Clement A. Smith. The Physiology of the Newborn Infant is a monograph which deserves more than passing notice. Pediatriclass and obstetricians particularly will find it useful. Lack of a source book of information on this subject has long been felt. New clinical observations and scientific research during the last few years have added much to knowledge in this field and have made all previous accounts of neonetal physiology obsolete. The present text assembles these data

The text concerns itself with the period of the newborn and its transition from fetal life. The subjects of respiration, circulation, blood, metabolism direction, assimilation renal physiology endocrinology and immunology are treated. Thus it is culte a complete treatise of neonatal physiology with the exception of the nervous system and sense organs. The author states that the absence of the section devoted to the pervous system is not an oversight most of the available knowledge upon that subject, he points out, is limited to the fetus or is anatomical in nature or considers the newborn period only briefly in relationship to general neuromuscular development. It is indeed true that physiology of the nervous system at the time of birth and during the first few months of life is a terra incornita

The author himself has contributed acientifically to a number of the subjects dealt with in his book. Thus he writes with great insight. The reviewer was especially pleased with the chapters on respira-tion and circulation. However each succeeding chapter of the book is so full of new and important information that it seems more important than the preceding one None is dull each makes good read-

ing One of the outstanding features of Professor Smith's monograph is the presentation at the conclusion of each chapter of a clinical summary in which the scientific data are discussed briefly from the standpoint of practical medicine. It is these summaries which make the book so useful to the clinical reader. Another interesting summary is found in a table printed on the back imide cover This is a table of normal values at birth and on suc creding days thereafter. It serves as a ready and handy reference synopsis Excellent bibliographics appear at the end of each chapter

The Physiol gy of the Newborn Infant is very at tractively printed and bound. It is not a large book. The text including the index occupies only 312

pages. Great credit is due the author for erttor into such small volume so very much metal and Interesting material WILLIAM F WHITE

THE third edition of Fractures of the Jees by by and Cartis<sup>2</sup>, will be received with proper ap-preciation by all who have to deal with manifofacial surgery The writing is clear and concre, and the subject matter carries the authority havel as vests of personal experience. The authors describe their own successful methods and also those of metemporanes in a generous manner. The character of the text remains the same, however various new techniques and methods of firstion have been added

We would particularly draw attention to the sections on roentgenographic technique and detay management. These two important adjuncts to the successful treatment of law fractures cannot be to highly commended. Proper attention to these precepts will facilitate reduction of the fracture and recovery of the patient.

This compact book is well and profusely illutrated and it is a pleasure to suggest that every dentist, maxillofacial and general surgeon work profit by adding it to his library to read, study and

have available for ready reference. FREDERICE W MEDICINE

THE Primer of Electrocardiography by George Burch, M.D., and Travis Winson M.D. deorfbes in detail the fundamentals of electrocardio raphy In the strict sense the title is somewhat misleading for the book goes into more detail this the word primer' would lead one to believe. On the other hand, the authors probably felt that ties was apropos inasmuch as only the basic considerations of this diagnostic procedure were correct.
Through the liberal use of diagrams, each post is adequately exemplified. The theories of electrocardiography precardial leads, and discuss of the beart beat are well covered. The chapter on the elinical significance of the various components of the electrocardiogram is well written and will be a definite value to the beginner It will also serve as a handy reference to those who are more thoroughly versed in electrocardiography as it contains many details which cannot be found in books streams interpretation. Although no photographs of actual electrocardiograms are included the important

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A PRINTER OF MELTICOCKEDIMENT BY Group Ranch, MD ACF and Traves Dissort MD Philadelphia Les & Frieger and TACF and Traves Dissort MD Philadelphia Les & Frieger and Tack Theory and

changes occurring in va yous types of heart abnor malities are adequately lemonstrated When used in conjunction with a manual stressing interpreta tion it should prove helpful in the study of electrocardiography

"HE second edition of a very clear and practical L book on The Intercritebral Disci by Bradford and spuring brings up to date our knowledge of this appearing names up to date out amornings of the clinical nuncer and places special emphasis on the cument dies Growth and mechanical factors are discussed in the first chapter with emphasis on the great antenor hydraulic compressive force placed upon the nucleus pulposus of the fourth and fifth lumbar dies in forward lifting strain Pathology associated with age change is comidered an important factor in disc herniation although sclerosis narrowing and vertebral hypertrophic changes are not commonly related to nucleus pulposus hermation

The clinical study of patients with "low back and catic pain" is very well presented except that there s continued confusion in reference to pain or along the course of the great sciatic nerve and lack of clear definition of symptoms and signs of single nerve root distribution. It is regret table that these authors who have been leaders in emphasis of neurologic diagnosis and unnecessary use of the spanogram should be unable to present any consistent dermatome pattern in the lower ex tremity and continue to use the somewhat un authoritative Tilney and Riley for illustrations of authoritative timey and rency for mustaction of dermatome patterns. These charts were taken from Dejerine (1914) without any very evident original work to support them, and certainly are outdated by the more authoritative work of Foerster (1933) The irregularity of the areas of hypesthesis in clini cal case illustrated in this book denotes inaccuracy of technique in plotting these areas Also there are conflicting statements about the occurrence of sensory loss in association with single nerve root in volvement the authors tending to adhere to Foer ster's dictum that this does not occur but citing a high percentage (75 per cent) of detectable hypes thesia in proved herniated nucleus pulposus cases with admitted single nerve root involvement. Better technique is needed on this subject as others are able to outline consistent diagnostic areas of derma tome hypalgesia from unquestionable single nerve

The roentgenological presentation calls attention to the u ual lack of diagnostic findings of herniation root loss. of the nucleus pulposus except by myelography or spinogram. The authors very properly reserve the use of the spinogram to atypical or doubtful cases in which localization cannot be made by history and betrologic signs calling attention to the possible complications and uncertainties of intraspinal

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Distinction is made in the application of manipu lation therapy it often being beneficial in earl) cases with predominant midline low back pain but liable to do harm in longer continued cases with entirely lateralized nerve root pain indicative of unreducible increased herve root pain indicative of uniconcine nucleus herniation. These latter cases may improve under long continued conservative rest or orthopedic treatment due to subsidence of acute swelling or to a destroyed insensitive nerve root. Surgical treatment by very limited hemilaminectomy carries less than I per cent risk does not significantly weaken the supporting structure of the back and offers immediate relief of the lateralized nerve root pain. A more conservative attitude is held when low back pain predominates as spinal fusion then may be necessary Single nerve root section may be done to free a nerve from fibrotic adhesions and leaves no

The final discussion is interesting in the critical disabling functional loss analysis of other reports The authors consider it now well established that total involvement of either the 5th lumbar or 1st sacral nerve will usually produce objective sensory changes Foerster's dictum, while on a later page they state involvement of only one nerve does not often pro-Dandy s contributions on concealed discs and surgical excision of discs duce hypesthesia. are considered not well founded Primary sciatic neuritis and sacrollac strain are called clinical curiosities kellgren's dermatome pattern of re ferred pain from interspinous ligament injection is commended for its dermatome localization but on the preceding page the authors state that localized pain-is not very reliable in identifying the roots involved by herniation of nucleus pulposus. The orthopedic idea that narrowing of the 5th lumbar intervertebral foramen commonly causes nerve root pain is negatived by the usual finding of a herniated nucleus pulposus compressing the 5th nerve root when symptoms of this root involvement are pres ent It is stated that there can be no doubt that ent at is scatco that there can be no sound that the incidence of anomalies is greater in a series of patients complaining of low back and scratic pain patients complaining of for back and scaling path than in a control series " inasmuch as this condition seems to predispose to nucleus pulposus herniation although in itself does not cause nerve root symp-

Cervical herniations are presented somewhat briefly but with emphasis on the recent establish ment of small lateral hermation in the lower cervical region as a common cause of pain radiating from the neck over the shoulder and into the arm and hand with subjective sensation of paresthesia or numbness. As in the leg the pain and numbress follow a compressed single nerve root distribution and hyperthesia or hypalgesia may be demonstrated Surgical relici can be given, as in the lumbar herniation after trial of conservative measures Occasionally wile hermation of annulus as well as nucleus will cause cord or cauda equina compres ion and deman is prompt relief by surgical procedure I IAY KYIGAK.

"HE author of Acute Injuries of the Head is one I of the leading neurosurgeons of England. By training surgical background, and large personal experience in the field of cranlocerebral injuries he is thoroughly qualified to write on the subject of bead injuries

The book is addressed to the general practitioner and the general surgeon whom the author regards as vital links in the care of patients with cranial injuries The subject of craniocerebral injuries has been covered from every angle in this book. The chapters on the mechanisms of injury and pathology are splendid. Those portions of the book describing technical procedures and operations are clearly written and generously illustrated. Posttraumatic sequelae are thoroughly dealt with. The author has given very thoughtful, realistic discussion of the organic and the functional factors contributing to the typical postconcussion syndrome with helpful guides for expressing the relative role played by these two factors in any patient. Principles of treatment described in the book will have the approval of most neurosurgeons. This reviewer differs with the author's opinion regarding the value of subtemporal decompression and repeated appeal drainage in the treatment of closed head injuries but it must be recognized that these are still un settled issues. The author's style of writing is pleasing and invites further reading. He tends to avoid generalizations and prefers to make his points by numerous well chosen illustrative case records.

would be in regard to the arrangement of subject matter The book might be improved a bit, in the reviewer's opinion, by a change of certain chapter headings for instance, Chapter III which is titled might better be titled "Clinical Diagnosis Manifestations and Typical Clinical Syndromes Again, the arrangement of subject matter might be improved in one or two places for instance, the chapter on pathology deals only with pathology of cerebral injuries, whereas the pathology of cranial fractures is dealt with in a subsequent part of the book, describing the treatment of these fractures At another place in the book, under the subject head ing of Spinal Puncture," the author digresses far enough to discuss treatment of primary shock, transfusion, the management of associated visceral wounds, and the excision of compound fractures. At another place in the midst of a chapter on diag nears the author consumes one full page in discussing the indications for subtemporal decompression. The discussion itself is entirely proper but the place in which the author has introduced it in the book apnears to me untimely

If any criticism were to be made of the book it

These are of course minor considerations judged against the general excellence of the subject matter and can be corrected in subsequent editions. The book is of comfortable size and pleasant to handle

Active Populates of the Head, Their Diagnosis, T EATMENT Consent troots we forcette. By G. F. Rawbeldons, B.fc. (Masch.) F. R. C.S. (Eng.), Forward by Norman M. Dott, M. B. Beltimora, Md Williams & W. Rims & Co. 1945

Paper and printing are good Illustrators are numerous and excellent. The author in his prefer to the second edition, says I believe that an general practitioner will find perusal of this book as only valuable, but will find the subject interestme and even exciting. With that opinion, I come JOSTY E. SCULT

"HE fourth edition of Kunts' A Taplied of A Neuroanatomy' follows the traditional patters of introducing the gross topography of the perces system with comparative and embryological ser tions then of reviewing the histology of serves tissue and proceeding from peripheral nerve into the spinal cord to mount by several stages through the brain stem and emerge at the cerebral corter. Within the limits imposed by such a reposal soproach, in which, for example consentive chapter are devoted to nuclear connections of the crasic nerves the cerebellum the diencephalon, the opticonnections and the autonomic nervous system, the author presents a clear description of neurosustors without excessive detail and with a conche summiat the end of each chapter. This last unusual feature will doubtless be greatly appreciated by the but pressed medical student of today

Passing reference to the functional and clinical significance of structures is made throughout the text and an entire chapter is devoted to that of the cerebral cortex A laboratory guide is appended, together with a series of case histones illustrating the clinical aspects of injuries to the peripheral nerves, spinal cord and brain. Because all the brain lexions resulted from vascular disturbance the student may wonder why no reference to the blood supply of the nervous system was incorporated H. W. Mroom in the text.

IN the third edition of Kuntz' The Interest Interest System, presentation of the general and omy and physiology is succeeded by detailed dicussions of the innervation of each of the orpus visceral pain, histopathology disease, and sato nomic neurosurgery Specific citation of original articles is a constant feature and the one besided twenty pages of assembled references constitute a unique bibliography in the many aspects of the field.

In the preface mention is made of the temptation to give undue weight to recent contributions that is resisted in varying degrees to preserve a balance between the new and the old. The reviewer is one she would like to have seen this resistance related is the discussion of such topics as the terminal retorion and ground plexus and the sympathetic innervation of skeletal muscle

The book is recommended as a valuable reference work to everyone interested in the autonomic ac-II M. News a vous system

HE work described in Pulmonary Tuberculosis in the Adult by Max Pinner! is a welcome addition to the tuberculosis literature. The material has been wisely selected from the welter of divergent viewpoints and connected or really solded into a unit that is clearly presented easy to rad and understand; and one that compels an

Doctor Pinner states in the preface that he does theorbing interest in the subject. not pretend to have written a textbook or a guide to not pretend to have written a textbook or a guide to treatment or diagnosis, but aims more to stimulate interest in the form of an introduction to the dy namic process of tuberculosis His purpose has been fully realized. In addition to the many fascinating essays on the discase the author has given a val nable collection of short abstracts of important art

No worker in tuberculosis or chest diseases should e without this book, although the work does not les on the various topics. lave, nor pretend to have anything but general

The illustrations are adequate properly chosen usefulness for the surgeon and well reproduced The type, printing paper and binding are worthy of the high standards already set by the publisher

THE third revision by Stander of Teribook of Designation of Obstatrace represents the night edition of Williams Obstetrics but it is published under the present author's name since, as he states in the preface it embodies his teaching and practice and therefore he assumes full responsibility

This volume consists of 1200 pages of subject
matter with over 700 well chosen illustrations. The first 500 pages deal with the anatomy of the female pelvis, physiology development of the fetus and change occurring therewith endocrine function and their practical applications in obstetrics, and the conduct of preprancy and labor An excellent review of the subject of analgeous and anesthesia is included The following 700 pages are devoted to the pathology of pregnancy labor and the puer persum. Abnormal pelves and operative procedures are considered here. The actions on toxemias, extrauterine pregnancy and abnormal pelves are particularly comprehensive and embody the latest contributions on these subjects. One important omusion, however is noted under the subject of contracted pelves, namely the Hillis impression method All other methods for attempting to determine the relationship between the size of the fetal head and the maternal pelvis are described. The Hills impression method since it is the simplest and without the objection of vaginal manipulation, is by far the most practical and useful of all such man euvers, and should therefore, be included in all

POLISO 18 Typers, LOST DE 1925 ANT. Its letter speet Appeters By Man France M.D. Speedfeld, III. Charles Chocass, equipment By Man France M.D. Speedfeld, III. Charles Chocass, equipment of 1975 and 197 obstetrical textbooks.

Stander's third revision of Williams' Obstetrics brings it up to date with such recent advances as the importance of the Rh factor in obstetrics and the addition of penicillin and the sulfonamides to the obstetrician sarmamentarium but it also retains the simplicity of style and the clear concise presentation of the subject that has characterized this text in previous editions.

"HE volume entitled The Osseous System" is the fourth of a series of handbooks of roentgen diagnosis being published by the Year Book Publishers. As in previous volumes the material is so arranged that the illustrations are on the right hand page and the description and legends on the opposite side. The concise but lucid subject matter is illustrated by 432 figures on 148 plates all in the negative Throughout the text, the author emphasizes the pitfalls of diagnosis and arges that the occasional radiographer always think of the maxim

might it be besides what I think it is? The contents of the volume is divided into five sections technique principles of interpretation roentgen anatomy injuries to the skeletal system other than the spine the spine bone diseases and abnormalities in childhood bone diseases occurring principally in adult life. A short bibliography appears at the end of each section and an adequate

This volume is a handy sized modestly priced atlas and can be recommended to general practi index is appended tioners surgeons and internists as a diagnostic aid It should be regarded as indicated as a primer rather than an encyclopedia

HE author of Electrotherapy and Light Therapy is an outstanding authority in the field of physical medicine. The fifth edition of this work offers a concise presentation of all present day phases of physical medicine with special emphasis on elec-trotherapy and light therapy. The newer uses and methods of electronics, electrodiagnosis, ion transfer and ultraviolet radiation have all been incorporated The chapter on exercise has been considerably en larged and a new chapter on hypothermy has been added together with a revised glossary covering defi nitions of electrotherapy and light therapy muscle and nerve action and mechanotherapy Each chapter has been brought up to date. New illustrations have been added and obsolete ones omitted. The illustrations are excellent.

One of the peculiar features of the book which has enabled it to maintain a position of leadership for fifteen years, is the interesting manner in which the subject b presented It contains much valuable information, and it is a safe guide to place in the hands of the practitioner

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"HE subject of this book is physiology not physiology from above but physiology from below not physiology originating essentially to fill human needs and help suffering individuals but physiology as a branch of physical chemical sciences dealing with life as a physical, though exceedingly complex system, that may be subjected to scientific analysis like any other natural object." Quotation is from the preface of Physical Chemistry of Cells and Tissues by Rudolf Hoeber et al

The reviewer is very much in sympathy with the aims of this book. American science in general, is far too concerned with practical applications." Nature is a lady who must be wooed for her own worth before she will reveal herself. Certainly there is a tremendous need for such a book as we have here and a still greater need for people with the viewpoint of the authors of this excellent text. It is a book which must be bought by all who wish to understand what is now known about many important phases

of life processes.

The first or pages were written by David L. Hitch cock and deal essentially with physical chemistry of solutions He discusses diffusion in solution, reaction velocity thermodynamics, electromotive force, osmotic pressure, electrokinetics and distribution coefficients. Hitchcock stavs on broad and well trodden highways. This section is clearly written but parts of it are very scratchy and rather thin For example, the reviewer doubts that a reader who is not already familiar with thermodynamics could profit very much by reading the chapter on this subject too much territory is covered in the 12 pages This brevity is carried to extreme in the dis cussion of dielectric constants, dipole moments and the Deby Hueckel theory of strong electrolytes. Two pages are devoted to these subjects!

Section a which covers 150 pages was written by J B Bateman In this section Bateman deals with molecular forces determination of sizes and shapes of large molecules hydration, protein structure x ray diffraction analysis, the structure of crystals and fibers and surface monolayers. There is much excellent material in this section. The part dealing with crystal structure is especially informative Bateman covers many complex subjects and the reviewer appreciates the great difficulty of present ing these topics simply but it must be said that this section suffers from a lack of clarity

The strictly biological part of the book begins with Hoeber's section (141 pages) which deals with the penetration of cell membranes by organic non electrolytes by electrolytes by weak acids and bases by dyestuffs by water and finally he considers the chemistry and physics of plasma membranes. He brings to these subjects more than 40 years of experi ence and he has performed a great service to all of us summarize g with completeness and detail the zisting kn wiedge about cell membranes. Hoeber

Payan, at Constitute of Critis and Tissues. By Rudolf Hosbit With combinations of D. I. Hitchcack, J. B. Raterman, D. R. Codshitt and W. O. Foss. Philladelphia and Toronto The Bakistan Co. 643-

follows the Collander and Baerland impid-size theory" of cell membranes. He discusses active to passive uptake of substances and describes low the can be distinguished from each other. One came help but have the feeling after reading this section that future progress in the study of cell penetuha must involve a fuller consideration of the interior of cells. It appears that the penetration and actor of narcotics is very obscure and would execulty bee fit by such expansion

A section has been contributed by David 1 Goddard (71 pages) on the respiration of cells and tissues. Goddard a section is simply written den and up-to-date. He deals with the rate of remeating as limited by the rate of diffusion of crypts. The kinetics of activated reactions are discussed and the a short chapter on the nature of oxidation he da cusses respiratory ensymes. There follows a chapter on the relation between fermentation and recontion. Finally there is a chapter on the utilization of liberated energy This last is by necessity very is complete since our knowledge of this utilization and

the present exceedingly imperiect. W O Fenn has 75 pages on contractile tires with special reference to striated and smooth made. This is a well balanced and critical review of exerments and theories of muscle contraction. It spens from this review that there still remains much to be known about muscle contraction. Muscle physiologi has passed through several phases until now a less become a sophisticated science and one has to have background in several branches of science to appreciate all the modern developments. One can, inever note considerable recent progress and as Fem writes, "At last the contractile machinery is it come more than a structure which is pessively stri upon by lactic acid or some other metabolic probat It is as if steam had at last been admitted to the previously empty cylinders of the muscle machine

Hoeber concludes the book with a section (170 pages) on passive and active transfer in animal plant tresues. In this section be deals with intestee absorption, formation of urine, permeability of job surfaces of animals and plants, formation of dective juices and finally a discussion of some of the mechanisms which may be involved in active tresfers. Here again as in the section on cell membrand HITTERY B. Beil. there is a wealth of detail.

HE fourth edition of Christopher's A Testan 1 of Surgery an already well established strat ard text by eminent American authors, has been made an even more complete and currently cored basic volume for students and reference point for practitioners. This has been accomplished through the addition of sections devoted to recent military experiences as well as the modification of other sections on the basis of progress in both civilias and military surgery In view of the earliness of pub-

A TEXTROOR OF STREETY By American Ascher: Paint by Pederic Christopher BS M.D. FACS at all years of Leaden: W. B. Sacnders Co. 1945

cation following the end of World War II remark ably few statements will require considerable cor rection as a result of reports on military observations made available subsequent to completion of the present edition. This volume maintains the high standards of format and illustration which charac terized previous editions of the work.

AMEROGE H. STORCE.

#### BOOKS RECEIVED

Books received are acknowledged in this department, and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender Selections will be made for review in the interests of our readers and as space permits.

TRATAMENTO CIRURGICO DO CANCER DA MAMA. By Alberto Francia Martins, M D Vol. 3, Nos. 9 and 10. Sao Paulo, Brazil Revista de Medicina e Cirurgia de Sao

Paulo, 1043

TRATAMENTO DE LAS ULCERAS PERFORADAS DEL ESTO-MACO Y D'ODOZNO BY JUÑO A. Acchal, MD ROSAFIO, Bradi Liberta y Editoria Ruiz, 1915 SURGICAL NUESTRO BY E L. Eliason, A.B., M.D. S.D., F.A.C.S. L. Kraeer Ferrauson, A.B., M.D., F.A.C.S.,

and Evelyn M. Farrand, R.N. B.S. 7th ed. Philadelphia J B Lippincott Co. 1945
TRANSACTIONS OF THE AMERICAN GYNECOLOGICAL SO-

CIETY Edited by Howard C. Taylor Jr M D Vol. 68. St. Louis The C. V Mosby Co. 1945

NITEOUS O'CIDE-O'CYCEN AMESTHESIA, MCKESSON CLEMENT, I REWFORMT AND TECHNIQUE. By F To Clement, Major M.C.(A.U.S.) ad ed Philadelphia Lea & Febi-

er, tou a le la commentation de la commentation de

By Toufick Nicola, M.D., F.A.C.S. Foreword by Norman T. Kirk, Major General, U.S. Army The Surgeon General,

New York The Macmillan Co. 1945
An Intraduction to Clinical Surgical
Surgical Wherefores and Therefores. A Reasoned Explanation of Surpical Note-Taking By Charles F M Saint, C.B.E., M.D. M.S., F.R.C.S. (Eng.) F.R.A.C.S. Cape Town The Post-Graduate Press by The African Bookman, 1945

HEN WITHOUT GONS Text by DeWitt Mackenie, War Amilyst of The Associated Press, Descriptive Captions by Malor Clarence Worden, Medical Department of the United States Army Foreword by Major General Norman T. Kirk, Supreco General of the United States Army, Illustraids with 37 Plates from the Abbott Collection of Painlings Owned By the United States Government. Philadelphia, Toronto The Blakiston Co., 1945 FERCTURAS—LUTAÇÕES TORCEDOZAS. BY RENATO DA COMI BOMÍN SÃO PLAID E. G. Revista dos Tribumis

Ltda 1045

INDUSTRIAL TOXICOLOGY By Alice Hamilton A.M. M.D. and Rutherford T Johnstone, M.D. Edited by Henry A. Christian A.M. M.D. LL.D. Sc.D (Hon.), F.A.C.P. Hon., F.R.C.P. (Can.). Reprinted from Oxford Loose Leaf Medicine, New York Oxford Univ Press, 1945 GYRECOLOGIC NURSING. By Robert James Crossen,

A.B M.D F.A.C.S., and Frances W Hoffert, R.N BS

Burrows, C.B.E Ph.D F.R.C.S. Cambridge The

University Press, 1945

SYNOPSIS OF GYMECOLOGY Based on the Textbook Diseases of Women. By Harry Sturgeon Crossen, M.D., F.A.C.S., and Robert James Crossen M.D. F.A.C.S 3d ed. St. Louis The C. V Mosby Co 1946 EL HOMBRE NURSTRO TEMA MORFOLOGICO By Prof Dr

Pedro Belou Buenos Aires La Semana Medica 1945. HOMEAJE AL PROFESOR PEDRO BELOU Buenos Aires

Guillermo kraft Ltda. 1941
THE CHEMISTRY OF AMESTHESIA. By John Adrian!
M.D. Springfield, III. Charles C Thomas, 1946
BRIGHTURST PARESS. Edited by Jack Penn, M.B.E.

F.R.C.S.E Johannesburg Witwatersrand M.B ChB University Press, 1944. THE PHYSIOLOGICAL BASIS OF MEDICAL PRACTICE BY

Charles Herbert Best, C.B. E., M.A., M.D., D.Sc., F.R.A. F.R.C.P., and Norman Burke Taylor, V.C., M.D., F.R.S. F.R.C.S., J.R.C.P. Baltimore The Williams & William Co., 1945
ROUNTON DLOROSIS OF DIREASES OF THE GASTRO-ROUNTON DLOROSIS OF DIREASES OF THE GASTRO-

ENTERTISAL TRACE By John T Farrell, Jr., M D Springfield Ill. Charles C Thomas, 1946

IRISH MEDICAL DIRECTORY AND HOSPITAL YEAR BOOK.

Sth ed Dublin The Parkside Press Limited, 1945 CLINICAL ELECTROCARDISONAPRY By David Scherl M D FA.CP and Linn J Boyd, M D., F.A.CP Philadelphia J B Lippincott Co. 1946

NUTRITION AND CHEMICAL GROWTH IN CHILDROOD

Vol. 2 Original Data. By Jicie G Macy Ph.D., Sc.D With a Foreword by Lawrence Reynolds, M.D. and a Supplement by Julia Outhouse Holmes, Ph.D. Springfield Illinois Charles C Thomas, 1246

## CLINICAL CONGRESS OF AMERICAN COLLEGE OF SURGEONS

W EDWARD GALLIE, President IRVIN ABELL, Louisville President-Elect

Committee on Arrangements
Howard Patterson Chairman Frank Glein Secretary

## PRELIMINARY PROGRAM FOR 1946 CLINICAL CONGRESS NEW YORK, SEPTEMBER 9 TO 13 1946

THE thirty-second Clinical Congress of the American College of Surgeons will be held in New York City at the Wal dorf Astoria from September 9 to 13. This will be the first Congress since the 1041 meeting in Boston. Between 1012 and 1015 the Congress was voluntarily enneelled each year in order to lessen the transportation difficulties and to conserve the time of medical and hospital personnel who were overburdened because of the absence of so many of their associates on duty with the armed forces. By autumn the majority of these will have returned and the time seems most auspicuous for a great postwar Congress. The preliminary announcement of the plans has been received with enthusiasm by both the military and civilian groups.

#### CLINICAL PROGRAM

Under the leadership of a strong and represent ative Committee on Arrangements, plans are under way for a complete and varied program for the five day meeting. The hospitals and medical schools will co-operate in scheduling operative and nonoperative clinics and demonstrations.

#### COMMITTEE ON ARRANGEMENTS

Howard Patterson, Chalmas Frank Glenn, Secretary Frank Adair Albert H. Aldridge Thomas M. Breman E. Jefferson Bross der George F. Cabill Henry W. Cave Ralph Colp Idward J. Donovan Merrill N. Foot John H. Garbock Charles A. Gordon George J. Hener J. William Hunton George H. Humphurys William F. MacFee John H. Mulbolland W. Barcley Parsons Otto Pickhardt Thomas H. Rassell Raymond P. Sullivan Howard C. Taylor, J. William Crawford White Philip D. Wilson

Visiting surgeons will have ample opportunity attend well arranged programs of many different kinds in several of the excellent hourtals in the Greater New York area. These programs vil include general and special demonstrations and as fractures, cancer maternal morbidity and end-result studies clinkopathologic and x-17 conferences newer diagnostic and therapeut procedures preoperative and postoperative say portive treatment anesthesa and recondition ing Those interested in operative clinics vil have an opportunity to observe newer technique and surgical procedures. A series of exhibit demonstrating the work of the medical schools and their affiliated hospitals will be available in study in the local hospitals during the medal, and the basic science departments of the medical schools will present graphic descriptions of ther work.

The program of each hospital will be amaging to cover subjects in general surgery obserted and gynecology fractures, orthopede surgery thoracic surgery neurosurgery genteemany surgery, ophthalmology and otdaryngology daily clinical bulletin will be published to how the presentation of subjects under these classifications so that the visiting surgeon may select the programs which he wishes to attend.

#### CONVOCATION AND PRESIDENTIAL MEETING

The opening evening session of the Chical Congress will be devoted to the combined production and the combined production. Since the left Congress in 1941 a total of 2 744 surgers have been received unto fellowally in selection, and to them in particular the Convocation on the opening night of the Congress will be a long antiogram event. Many of these new Fellows have been

serving with the armed forces. The formal initi ation ceremonies, always impressive, will be ex ceptionally so this year because of the large number of new Fellows accepted during the past four years who are expected to be present, in

addition to the 1946 group of initiates Officers, Regents, and Governors have remained in office since 1941 because of the cancel lation of annual meetings of the Fellows and Governors. Especial interest will also therefore beattached to the installation of the officers elect consisting of Dr Irvin Abell of Louisville, chair man of the Board of Regents as president Dr Leland S McKittrick of Boston as first vice president and Dr F Phinizy Calhoun of Atlanta

Dr W Edward Gallie of Toronto who has been as second vice president. president since November 1941 will give the Presidential Address.

### SCIENTIFIC SESSIONS

The scientific sessions to be held on Tuesday Wednesday and Thursday evenings, will be ad dressed by eminent surgeons and specialists, recognized as authorities in their fields. Special scientific meetings will be arranged on the same evenings for specialists in ophthalmologi and The newest developments in general and special fields will be presented in the well rounded program for these evening seamons. otolaryngology

Every afternoon from Monday through Thursday panel discussions led by recognized authorities in each field aided by well qualified collaborators, will be held Similar meetings held during past Congresses have been most successful largely because of the fact that they permit the particl pation of a large number of surgeons, thus in creasing the opportunines to learn from the ex

Preliminary plans include the holding of a penences of others. symposium on fractures and other traumas on one afternoon, and a symposium on cancer on another afternoon There is always wide interest in these special meetings. Plans for several new features have been discussed but cannot be announced until definite decisions have been made in co-operation with the Committee on Arrangements

#### FORUMS ON FUNDAMENTAL SURGICAL PROBLEMS

Great interest has already been shown in the plans for reviving the Forums on Fundamental Surgical Problems which were so popular at the Boston meeting Research activities have been retarded but not stopped during the war period

and the accumulation of the results of five years of work since the last Congress will certainly assure the presentation of intensely interesting maternal. The plan is to conduct these forums on Tuesday Wednesday Thursday and Friday mornings, and to include in them brief reports of original clinical and experimental observations relating to the broad aspects of surgery and sur gical specialties. No prepared discussions are planned but questions and comments will be invited. The enlistment of the interest of young men who are doing original work, through these forums, is one of the most beneficial results of these sessions which are now considered to be an indispensable feature of every Clinical Congress

### MEDICAL MOTION PICTURES

Medical motion picture exhibits will again be an appreciated feature of the Clinical Congress The latest available pictures showing surgical procedures and related subjects will be shown The accumulation of such pictures during the war has not been great but nevertheless a surprising number of new films are being received for review by the College and an interesting variety of edu cational pictures is assured The schedule will be arranged so as not to conflict with either the clin ical program at the hospitals or the scientific sessions. Both sound and silent standard and color films, will be shown all of which have been approved by the Committee on Medical Motion HOSPITAL CONFERENCES

The first formal session of the Clinical Congress Pictures. will be the opening meeting of the twenty fifth Hospital Standardization Conference. Dr W Edward Gallie of Toronto president of the Col lege, will preside. The hospital conferences will continue on Monday afternoon, with sessions following on Tuesday Wednesday and Thursday mornings, afternoons, and evenings.

Hospital administrators, members of governing boards, heads of the various hospital departments and their personnel nursing groups and many other persons directly or indirectly concerned about hospital progress will be interested in the discussions of current hospital problems. Na tional organizations representing various groups of hospital personnel will co-operate and participate in the meetings, which will include formal sessions, panel discussions round table confer ences, and open forums. ADVANCE REGISTRATION

The hospitals and medical schools of New York City afford accommodate -- for a large number of visiting surgeons, but to insure against over crowding attendance at the Congress will be limited to the number that can be comfortably accommodated at the clinica. The limit of at tendance will be based on a survey determining the available facilities in the participating has nitals and schools. It is therefore expected tha surveons who wish to attend the Congress will register in advance.

In accordance with a resolution adopted by the Board of Regents fellows of the College whose dues are paid to December 31 1046 initiates o the classes of rost rost tost rost and ros6 and fellows in military service will not be required to pay a registration fee for the 1046 Clinica Congress. For endorsed junior candidates the feis \$1.00. Surgeons, not fellows, who attend a invited cuests of the College, will pay a registra tion fee of Storo

For purposes of identification at the registration deak, fellows should present their fellowship cards Those surreons who pay the registration fee i advance will receive a formal receipt which they will exchange for a general admission card upon presentation at the registration deak in the Valdorf Astoria Hotel.

#### HEADQUARTERS AND TECHNICAL EXTURITION

Headquarters for the Congress will be established at the Weldorf Astoria where there are excellent facilities. The Technical Exhibition will be held on the Third Floor near the Gran-Ballroom. Leading manufacturers of surgica instruments and supplies, sutures, dressings pharmaceuticals, operating room equipment, x ray apparatus, hospital equipment of all kinds, and publishers of medical books will be represented in the exhibition, which will provide visiting sur meons and hospital people opportunities to inspeccarefully the newest and best products of al those industries which are helping to improve th service of hospitals and surgeons.

#### NEW YORK HOTELS AND THEIR PATES

Resides the Waldorf Astonia, there are a number of first class hotels which are conveniently located. In view of the extreme shortage of hote rooms which is expected still to prevail next September it is urged that reservations be made as soon as possible. The hotels which are true mended by the Committee appear in the loan ing lest

t_		Mini	- P-
E S-		Aith	P.4
it		Single	D,
II	Allerton House, 143 East 30th Street. Allerton House for Women, 130 East	\$2.75	
е	57th Street. Ambassador, Park Avenue & 51st Street.	100	
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e of	Barbizon (Women), Lexington Ave. &	ىو ر	41
	63rd Street	3.50	
5	Barclay 11 East 48th Street	6.00	11
d	Street  Belmont Plane, Lexington Ave. & 40th  Street		6.0
al	Beverly Lexington Ave. & 50th Street	.4∞ 5-00	9.2
æ	Biltmore, Madison Ava. & 43rd Street.	5.90	73
LS	Bristol, 120 West 48th Street	1.50	3.9
2	Capitol, 51st Street & 8th Avenue Carlyle, Madison Ave. at 76th Street	\$00	45
	Chesterfield, 130 West 40th Street	600	
n	Commodore, Lexington Ave. & 4md	#720	4
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n	Concourse Plaza, Grand Concourse &	• •	
y	If It Street	3.50	59
á	Cornlah Arms, 31 West 23rd Street.	1.17	ť.
ıe.	Delmonico, 50s Park Avenue Essex House, 160 Central Park South	600	ï
_	Fifth Avenue Hotel, 24 Fifth Ave.		
	(oth Street)	400	-
	Governor Clinton, sest Street & 7th Ave.	1.30	44
	Henry Hudson, 353 West 57th Street Kenmore Hall, 145 East 3rd Street	200	12
<b>)</b> -	Lexington, 45th Street & Lexington Ave.	400	1
-	Luxor Baths Hotel 2 West 40th Street	2.15	
-	McAlpin, Broadway & 14th Street	3.30	,,
ņ	Martinious, Broadway at sand Screet	2.73	4.0
ď	Midston House, 22 Last 35th Street.	1.50	7.
ıl	New Weston, Madison Ave. & 10th Street New Yorker 34th Street & 8th Avenue	1 35	5,5
в,	Paramount, 46th Street, West of Broad	-	
y.	WAY	3.00	
d	Park Central, 7th Avenue & 15th Street	400	
ם	Parkelde S Gramercy Park South	3 85	5.5
	Pennsylvania, 7th Avenue & 33rd Street	300	50
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11	Piccadilly 227 West 45th Street Plymouth, 243 West 45th Street. President, 234 West 48th Street.	150	
e		6.90	19
	Roosevelt, Madison Avenue & 45th St.	.450 350	ço
	Shelton, 40th Street & Lexington Avenue Talt, 7th Avenue & 50th Street	مفو	
	Times Square, 43rd Street & 8th Avenue.	2.25	4
F-		2.50	4.9
	Victoria, 7th Ave. & 51st Street Waldorf-Astoria, 50th Street & Park Ave-	7.00	74
y 1	Waldorf-Astoria, goth Street & Park Avenue	500	_
-	Warwick, 54th Street at Sixth Avenue Wellington, 7th Avenue & 55th Street	300	45
	Woodstock, 127 West 43rd Street	300	,-

March, 1946

## International Abstract of Surgery

Surgery, Gynecology and Obstetrics Supplementary to

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## INTERNATIONAL ABSTRACT OF SURGERY

HUMBER 3 MARCH, 1946

# ABSTRACTS OF CURRENT LITERATURE

## SURGERY OF THE HEAD AND NECK

traus, J., and Briggs, W. A. Intraocular Foreign Bodies. Problems of Localization and Opera noures, Properties of Languages and SP tive Procedure. Bril J Ophik., 1945 29 557

In this article the authors discuss intraocular foreign bodies, the problems of their localisation and the operative procedures. They point out that the posterior approach for the extraction of intraocular oreign bodies, except in cases in which the foreign body is situated anterior to the lens, has become more popular since the war principally because new materials of low magnetic properties have been introduced into the manufacture of war instruments and munitions. Moreover metallic alloys of low magnetic properties will also most likely be ex tended into peacetime industry. They suggest a new method of localization which requires a less compleated and delicate apparatus than that of Sweet, s well as a new method of extraction. The limbal method is simple but it is not suitable for intra ocular foreign bodies of low magnetic quality or for nonmagnetic foreign bodies nor does it provide an accurate measurement of the point on the sclera to e incised from a fixed point on the eyeball

The authors recommend a method which gives the exact position of the foreign body in the eye to be operated on and the exact point to be incised on the siders (determined by I lateral x ray picture and I posterosnterior picture) To find the diameter of the ere, 3 lateral exposures are taken on the same film with the eye directed forward, upward, and down obeled the rest films the following data are obtained the radius of the eyeball the distance of the foreign body in front of or behind the equa tortal plane the meridian in which the foreign body has from the center of the eye and the distance of the foreign body from the center of the eye, procedure comprises the use of a conjunctival flap unuse exposure of and incision into the sciera, urface disthermy with 100 ma for 2 seconds (for coagulation) incision of the choroid and interrupted application of the magnet for about 2 seconds at 2second intervals for 50 times before discontinuance of the procedure as useless.

A duagram of a pair of forceps for the extraction of intraccular nonnagnetic foreign bodies is pre-

Von Sallmann Lat Penetration of Penicillin into the Eye; Further Studies. Arck Ophil. Cklc., sented

Previous studies on the penetration of penicillun into the eye after topical and systemic use were carried out with commercial preparations and the concentrations obtained in various parts of the eye were expressed in Oxford units A comparison of were capitased in Oziolu units in Oziolu units these results and those of the author is not possible since he used relatively crude preparations and titra

tion according to the Oxford method was not done The Fleming dilution method was used and the con centrations were given in micrograms per cubic Three local methods designed to introduce com centimeter

paratively high concentrations of the drug in the anterior segment of the eye were tested on rabbits and the results compared these methods were subconjunctival injection, ontophoresis, and applying cotton packs saturated with a penicillus solution

A comparison of the results with a solution of A comparison of the results with a southern of commercial sodium penicillin containing 5 000 units oper cubic centimeter showed that the highest conper cubic centimeter showed that the highest concentration was obtained in the aqueous by iontophoresis, and in the corner and the iris with the ciliary body by the prolonged application with cot ton packs. The lowest concentration in the aqueous cornes, and iris with the ciliary body was observed Extremely high concentrations were found in the after subconjunctival injection

cornes and the iris with the cliery body after the application with cotton packs saturated with a solu tion containing 20,000 Oxford units per cubic centi meter The content in the aqueous was also higher following this method than after any other

The ocular tissues and aqueous were almost com pletely free of penicillin 8 hours after iontophoresis with a solution containing 5 000 Oxford units per cubic centimeter and after a solution containing 20 000 Oxford units per cubic centimeter was applied by saturated cotton packs

I general nly traces were found in the lens and tro us after the real alm nistration

D t minati r on human eves with normal and with elematou corneas gave more etratic n ult and hunch l n r alies than d t ministions n rall bit ves Li itr L. McCov MD

Dena F P : Tuberculosis of the Chorold with Inclusion of Bone Tis use (F berculosis d la corles et dudon de t Jid osen) trek is endutera Me 1945 3 207

A child 5 years of age was sent to the auther for camination on account of failin who hotolish bia, and redness of the left eye. Direct illumination howed a tumor of the auteric part of the cyball, involving chieff, the choroid General examination showed a primary tuberculo of the line which was active caudative slight in extent but mod rately a knoored. The Mant ux reaction was positive at 1 1000. Quarterily there had been a bemat gen us his semination of tubercle bacillifer in the Lingto the life eye.

Miter 6 in 1th of treatment at a taberculous h 11th the pulm nary on lith in as greatly im proved but an imbeychitis hall developed in the event of the name of the suspect specimens he well consil in I alwa able. The suspect specimens he well a chronic intainmant ty process with in lutes made un of various types of cells, preclominantly epithe

hard cell and koester's follicles

There were also fragments of lone in the chorsolbut there was no apparent reaction around them. There were evidently two independent findings a malary heratoromous tuberculosis of the chorn I and in taplastic cone it sue in the conjunctival to use of the chorold. Soon of the bone fragment were within the tuberculosis to use and some I them usts for it. It seems probable that the ost (cat) in I the chorold tissue took plee in emley no clife and that the lone tissue created a point of least resistance which favored the localitation I the tubercul i there. Versary G Monay M D.

Márquez, M The Technique and Clinical Value of Injection of Hypertonic Salt Solution into Tenon a Space in Detachment of the Relina (Tendez y alor clinic del la injectiones intantonian a hipertonicas en el despreni mient de la retina) A ch. At entir estre esquesa Mi 1013 3 207

A case of traumatic detachment of the retina is described in a boy of 13 years who was indured with a shotgun one of the abots lodging in the external part of the lower conjunctival called sac and cast ing great external hemorrhage and pressure on the eye-ball. There was detachment of more than half of the lower part if the retina with a small introduce per fration of the macula, through which the red color of the chorold could be seen. Central wish was abolished as well as more than half of the upper and a part of the internal which.

This case was treated by a preliminary injection for figure cent novocaln hydrochloride

followed by the Injection int. Tenon's spacestree of the properties at solution originally specified to the reduced to a per cent by the aid in official manufacture. This proved appetits to the solution present in following two Three injection presents of the solution of menty given. Three injections are given. The avoid field was rest red to absolute the solution of the solution

See rall, ther cases presenting successful main ar reviewed briefly and a case in which the tien ment was not successful, probably because of tachment of the chu rold by extendre kemorthie. Rest in bell and paralyses of the clinary marks with attorner are useful supplementary nessures.

Detachment without ruppermentary pressures.
Detachment are discussed and the limpitation of detachment are discussed and the limpitation of studies of the visual field it is emphasized. Does not that this method has not been used more eiters that this method has not been used more eiters before it that linject in into Terona square has been confused with subcondunctival injectivas. Back confused with subcondunctival injectivas. The studies of the cyclaid and it superficial. However, inconsist pare is deep and surrounds the poster part of the cyclaid. The needle used for the time is curved with the opening toward the consistency side of the needle which is turned to and the current of the cyclaid. The injection is make a lift inferroity and cut mailly and as far back in Terospace as possible.

Many cases are cured by this method, but it falls it does not interfere with the later we dirigical procedures.

Appert G Moscar, MD

#### Klien B 4.1 Syndromes Leading to Enoclarion (m J Ophio 1915 25 210).

The results of the studies reported in the studies what there are several other equal impours of frequent cond tion besides chronic several infiltrating fishocycl til which lead in superiors of ympathetic ophthalmia after time. The vers selected f i this study ball accounts thould be agrail painful state of irritations thould be agrail painful state of irritations of fammation. They were classified into a gray group (i) those in which the terminal following the continuous with the immediate post tension treation and (i)) those in which take a quescent interfunction and (i)) those in which a quescent interfunction and (i)) those in which a quescent interfunction and (ii) those in which a quescent interfunction and (iii) the section of the properties of the section of the properties of the section of the se

Croup can be de soul and the soul mill space of dephthalman which was characterised by modern behavior and the soul client market control with the proventions become similar and client market contestion of the processing the processing of the processing the processing the processing the stationary without any signs of absorption stationary without any signs of absorption and the stationary without any signs of absorption in the stationary without any signs of a stationary without the stat

Croup 2 consisted of (a) chronic post-traces is infiltrating iridocyclitis in which the interest be tween the traumatic reaction and the appearance of the corneal precipitates in the injured eye was Two of these cases had a tuberculous uvertus which ras bilateral Two other eyes become painful and inflamed suddenly after 7 and 40 years respectively during an attack of influence) (c) chronic hemoph thalmos, illustrated by a case of double perfora tion of the eye with glass which resulted in profuse intracular hemorrhage and required enucleation miranous neutrinege and required photophobia four years later (There was marked photophobia iour years sate: (Lincio was immerced pino pindelini and ciliary injection in the fellow eye). (d) epithelini and ciliary injection in the fellow eye). (d) epithelini and ciliary injection in the fellow eye). frequent complication of epithelial implants was present in only 3 of the 9 cases), (e) rupture of the degenerated lens and (f) extensive retinal disinser ton and detachment. Six cases showed this condition, lu which a mild late iritis required removal.

Seventy seven eyes were enucleated 17 or 22 per cent, presented nonspecific infiltrating indocyclitis 20 of 26 per cent, chronic septic endophthalmitis 9 or 12 per cent, epithelial implants 8 per cent, chronic hemophthalmos, extensive contusion ne cross, and late toxic iritis after longstanding retinal detachment 5 per cent, endogenous iridocyclitis 3 per cent some rarer conditions and 8 per cent sym pathetic ophthalmia.

Lindsey J R Oppenheimer M J Wycis, H T., and Spiece E. A.: Receptor Apparatus of the Vestibulovasomotor Reaction

The labyrinthine reflexes upon the vegetative nervous system form an essential part of the various types of sickness caused by motion. Information is lacking regarding the receptor apparatus for such reflexes and therefore this study was undertaken

The observation had been made (Spiegel and Scale) that in cats in which for other reasons bilat eral puncture of the round windows had been made rotation failed to produce a postrotatory nystagmus, but still was able to produce a fall in the blood pressare. Since the otolithic appearatus might still have been the origin of the vasomotor reaction the present experiments were undertaken to determine the effect of labyrinthine stimulation on the blood pressure after the otoliths had been thrown off the maculas, to abolish the tonic labyrinthline reflexes

Guinea pigs were centrifuged according to the method of Wittmack to dislodge the otoliths. The animals were tested for postrotatory nystagmus, re flexes on linear acceleration and positional reflexes before and after centrifugation Centrifugation for I minute at 1 500 revolutions per minute resulted in the obliteration of the positional reflexes (righting of the head and compensatory eye movements) and partition complete loss of reflexes on linear accelera tion but in most of the animals the postroistory nystagmus remained undiminished, which indicated active responses from the semicircular canals How

ever a fall in the blood pressure could still be charted upon rotation. Histological preparations con firmed the dislogment of the otoliths from the maculas while in most instances the cupolas could

be observed in their normal positions The experiments show therefore, that the reflexes on the vasomotor system do not depend alone upon a of the vasibilities appearatus. However, they do not rule out the possibility that the otolithic appearance in the possibility that the otolithic appearance is the possibility of the possibility that the otolithic appearance is the possibility of the possibili ratus may contribute to the vasomotor reaction The vasomotor response had formerly been shown to penist after abolition of the postrotatory response but to disappear temporarily on the injection of cocaine in alcohol to paralyze the whole labyrinth or comme in account to paralyse are whether says much several interpretations are possible from these ex perments but it seems not improbable that the abyrinth functions as a whole as a receptor for reflexes on the vasomotor system and that the various receptors can substitute for each other

JOHN R LINDSAY M D

Druss J G: Aural Manifestations of Leucemia Arck Otolar Chic. 1945 42 167

An analytic review of the medical records of 148 subjects with leucemia admitted to the Mount Smai Hospital in New York, New York, over a period of

5 years yielded the following conclusions Aural complications of leucemia are more prevalent than is generally believed. They occurred in 25 of the 148 CRES reviewed or in 168 per cent. Routine cramination of the cars including functional tests of the cochlear and vestibular nerves would disclose an even greater incidence in all likelihood. The sural complications include diseases of the external mid dle, and internal ear and of the adjacent structures The pathological changes in the ear as elsewhere in the body are comprised chiefly of hemorrhage, cellular (leucemic) infiltration, and inflammation. Pathological changes in the ear may be revealed on histological examination even in cases in which there was no clinical evidence of aural disease at any

Ottic infections are comparatively more severe time during the illness in the leucemic than in the nonleucemic patient they not infrequently show a strong tendency to ward early invasion of the adjacent structures The diagnosis of acute mustoiditis in a leucemic subject may paradoxically be made more difficult by the presence of postauricular swelling and sagging of the bony external canal wall since these signs so well recognized as pathognomonic of supports tion in the mastold bone may under such circum stances also represent leucemic infiltration in the adjacent soft parts

Lindsay J R.: The Significance of a Positional Nyatagmus in Otoneurological Diagnosis. Le-

Postural vertigo and its accompanying positional nystagmus is the most common type of vestibular disturbance in diseases of the central nervous system. It occurs less frequently in peripheral ear

hisrascs. The syndrome can be on lucid during n utine neutional test. In kn wn lesion, central and peripheral in types of positional ny tarmu may be lifferentiated. The first type which i ic regular in direction or changes lirection with al teration f the position is fund only in diseases invilance the central vestibular nathans second type with con tant directly may seem in either central r peninheral diseases Attack of vertigo of the pseu lo Ménière type in which au fit its di turbances and central neurological sien. are absent have been found t exhibit a postural character a a need minant feature

In a series of m re than to cases of the men lo Ménière à pe with | sitk nal n stagmus at the but a This wall appear the strong evidence of a central beath n I the disturbance It is pos ble n the bas of a sociated sit mic en it differentiate

weal groups in the general metals Ménule group such a hypertension and arteriosclemsis t see involvement la taleure aufection and hypoten ion, while a small number c main, foultful a cholory Approximat I be half if this could be included in the beautening erous on the bases of low blood pressure and explence for amatar insufficiency North Fig. ic sr M.D.

#### Weinstein, I., and Atherton, H. B.: The Treatment of Acute Supportative Otitie Media J. In 1/ 111 1045 110 5 1

The authors purpose in undertaking the wirk reported in this articl wa t a certain the fective ness of penicillin as a cure in the treatment. I supportative office media and as a means fire venting complicate n when given very early in the course of the disease, to determine the effective dose range and the length of time over which treatment had to be e ntinued to ascertain whether or not there is any correlation between the total amount of the antibiotic ubstanc required t produce good results and the type of organi m which i responsible for the infection and to study by means I x ray examinations, the effect of this type of treatment on involvement of the mast id

It appears that penkillin is a very effecti re agent in the treatment of acut uppurative offit media

of which gram positive energiate the cause Complications of suppurative offits media are reduced to a minimum and ma tolditis which i by far the most common of the sequela following middle ear infection i almost completely eliminated by penkillin therapy

Fifty cases of acute suppurative offits media 45 of which occurred as a complicate n of scarlet fever were treated with varying doses of penicillin intra muscularly. The external audit ry canal was free from vudste in 82 per cent of the patients in less than 4 I days following the institution I therat s Recurrence I the infection was observed in 16 per cent of the patient and these responded well t treatment with larger doses of penicillis

There are eared to be some degree of correline between the t tal denage of penicillin regime to effect a cure an I the type of otransm professes mid the ear infection. Infections in which the been lytic tanha lococcus aureus was present abre en combination with the beta-hemolytic strentours seemed to be more resistant t themes but a so n led to larger quantities of the antiliotic ager

t omniscath as of acute supporative outs pola were reduced t a minimum, and mattaklettone an

als infrequently persons

Secondary infections with gram negative better \* te \* Il controlled by the local administrative of to per cent urethane and t per cent sulfanila- be Acureu solution

The f llowing regimen is suggested for the trat m nt facute suppurative out is media intra ruce lar administration of \$1,000 units of peace mmediately after the appearance of exidate is the external audit by canal and repetition of the art k se even a bours until the aural decharre bashes completely absent for 12 hours.

II too R From MD

#### Atkinson, M.: Ménière a Syndrome: Comrades d Results of Medical and Surgical Treatment. Irch Year Parchial Chic. 1016 to 101

The author reviews the various medical tresment in popular use for Mendre's exeducet ! clu le e salt-free d'et and dehydration, sodien fre let plus ammenium chloride low salt diet and ammonium ebloride, high pota lum diet, battert ntravenou ly and nic tinic ac L. It is believed that ach of these methods of treatment will give mid r improvement of vertico in from 61 to 00 per and

I rases. The incidence of improvement in dealing and in tunnitus varies from 0 to 16 per cent. Sees lating on the cause for the similarity of results cotained with these arious medical treatment the theory I a common ba le factor which is allered favorably by all of these treatments is suggested Increased capillary permeability is succested as seca factor and may be due to one of two cares anoxia from a d mini bed blood supply or senson tion t some f rm of protein r chemical. On the ba is the favorabl action of each of these vances medical treatments might be explained. The author has had better experience with nicotine and and hi tamine desensitization in appropriate cases that

Surgical treatments for the prevention of attacks

with other treatments

of vertigo are also discussed Pertmann a operation on the saccus ended aspest icus does not sacrifice hearing but has not met wat general favor probably because of 25 per critialiures. Rem val of foci I infection, lake recomended highly by me writ r has failed t gi em sult in the hands of others. Sectioning of the vestibular I rtlon if the eighth perce is critered because if its fail re t releve the dealness and tinnitu although the latter may sometimes be isproved Operations on the laby rinth comist of two types those which destroy the labyrunthine function completely and those which destroy only a part of the vestibular function. The former has the unde sirable result of destroying hearing and is unmultable in bilaterial cases or those with useful hearing in the affected ear. Experience with the second type of operation is not yet sufficient, but it seems to offer a safer and more logical procedure in that hearing is preserved.

In conclusion the author points out that medical treatment will relieve or control attacks of vertigo in about 80 per cent of cases and will give relief from tinnitus in about 20 per cent hearing can be improved in about 20 per cent of cases. Surgical treat ment is recommended only as a last resource to abolish attacks of vertigo

JOHN R. LINDSAY M.D.

Fowler E. P Early Diagnosis and the Arrest of Otoscierosis (Cilnical and Histological Otoscierosis) Arch. Otelar Chic., 1945 42 853

Otosclerosis is the name given to a disease of bone which begins in the bony wall of the labyrinthine capsule. It can be diagnosed only by the occurrence of deafness which is due to a limitation of mobility at the annular ligament which impedes the vibration of the stapes. Such signs as a pinkish glow from the promontory an apparent increase of hearing for bone conducted sounds a positive Gellé test, im movability of the malleus a normally patent custa chian tube scantiness of cerumen hairs and sweat glands in the external canal, and a family history of otosclerosis with no previous history of aural disease all point to a duagnosis of otosclerosis but all of these signs may be absent in the presence of otoscleroses and all may be present in the absence of otosclerosis

Available statistics based on histopathological examination (Guild) indicate that 7 55 per cent of white people harbor otosclerosis, but that only about 1 per cent have ankylosis of the stapes. Adequate statistics in the colored population are lacking but those available indicate a much lower incidence of otosclerosis possibly 1 per cent. The disease tends to be most active under the age of 20 and least active after the age of 60 years.

The only clinical indication of beginning ankylosis of the stapes is a slight lowering of the hearing acuity for the lower frequencies. In uncomplicated active dotoclerosis with ankylosis the loss of hearing progresses inversely with the frequency or pitch of the tone. There is as yet no knowledge as to the etiology A smills disease of one has not been found in other parts of its disease of the progression of

parts of the skeleton. In order to detect

In order to detect early otosclerosis every child should be examined when it enters school and a history of progressive deafness in the family should lead the observer to examine the child more frequently and to institute measures to correct any shoormali tes. Attention should be paid to hormone factors and certain vitamins and minerals especially around the age of puberty. There is no impressive evidence

that the fenestration operation arrests the otoscle rotic lesion.

JOHN R. LINDSAY M.D.

Shambaugh G E. Jr Fenestration Operation A Clinical Study of the Permanence of Ita Reaults. O Bull Northwest Univ M School 1945 19 259-

The history of the fenestration operation is the story of the search for a method of making a laby rinthine fistula that would remain open.

The early operations falled because new bone formation always closed the fistula with loss of hear ing improvement in a few weeks or months after operation. It is now possible to create a fistula in the bony labyrinth that will usually remain open. This is due to advances and changes in technique employed most recently shifts the position of the fenestra and the application of the skin flap so as to enhance the conduction of sound vibration from the tympanic membrane to the fistula. This has been employed in 173 operations

Closure of the fistula to sound occurred in 6 57 per cent of 800 consecutive flenstration operations. Analysis of these cases showed that with each improvement in technique the percentage of closure diminished. The majority of the closures occurred within the first year after operation and in only 2 cases did they occur later than two years after operation.

The entitusm most frequently levelled against the fenestration operation has been that the hearing results would be trainstory because of bony closure of the fistula. This prediction was borne out in part in the early operations done by the original Lempert technique. Successive improvements in technique, however have successively reduced the percentage of failures due to bony closure. With the technique used by the author during the past 2½ years 77 per cent of the cases permanently maintain a function ally wide open labyrinthine fistula with maximum hearing improvement while 86 per cent present a significant hearing improvement.

JOHN F DELPH M D

#### NOSE AND SINUSES

Lumsden R. B. Otolaryngology in the Army J Lar Otol. Lond, 1945 60 91

The author reviews his experience in otology during a period of 414 years in the Middle East

Ottis externs presented a high incidence in the summer months particularly among new as compared to seasoned troops. Swimming appeared to be an etiological factor but was not of prime importance. Actute ottis media showed a high incidence during the summer which also was related to swimning only as few of the patients observed had not been swimming shortly before the onset of infection. Swimming while suffering from a cold appeared to be the most important factor in the onset of both ottis media and actue insultis.

The results which followed limited local use of penicillin in the treatm at of change sinusitie were unconvincing. The authors opinion was that the climate was not beneficial to unper respiratory in fections

During the year of you and early in your as per cent of nationts with acute otitis media required ma told operation. During the similar percel in tota and tota 87 per cent of national required

operation

A review of the complication of oritis molia showed 3 cases of meningitis with a recoveries 3 cases of lateral sinus thrombous with a recoveries a cases of temnorounhenoidal lobe abscesses with a recoveries coases [ labrrinthitle with c recoveries and a cases of multiple complications all fatal. The incidence of petrositis in the complicated cases par ticularly in patients with laborinthiti was bleb. Atrophic thinitis seemed to be aggravated by the bot dry climate and all but the mildest cases had to be returned t a temperate climate. Diphtheria proved to be a more dangen us disease in the Middle hast than in temperate climates. Neuritle was a common complication and frequently exten ive

Approximately to per cent of casualties of all types were found to have sustained some acres tie trauma. Mixed deafness was found in 10 per cent of such cases. In one hospital, over 50 per cent of runtured drums in traumatic cases had a supera I led otitis media. This was attributed on liably to un warranted local interference particularl with the syringe and insuffiction of sulfonamule powder. The only local procedure which was advised in such cases was the application of a pluz of cotton wool and removal of impacted wax with a scoop, when percessary Jours R. LEND Y M.D.

#### HOUTH

Ebenius, B.: Cancer of the Lin. A Clinical Study of 778 Cases with Particular Regard to Predispos Ind Factors and Radium Therapy 1cts admi-Stockh., 1943 48 12

In his investigation of the Radiumhemmet 11 cancer material the particular aims of the author have been (1) to find a practical definition of the term, "Ilp cancer;" (2) to throw light on the signifi cance of the so-called predisposing factors and of the precancerous conditions in the development of lip cancer (3) to clarify the differential clinical pictures of the lip tumor (4) to determine the frequency of metastasis the usual time of its appearance and its relation to the status of the primary tumor (5) to illuminate certain technical problems of treatment in interstitial irradiation (6) to evaluate the radiological treatment in relation to the cure results obtained on the basis I calculation, i.e., without the elimination of specific categories of cases, and (7) t liscover which fact is influence the curability of hip cancer and thereby the prognosis.

The author had at his de posal a series of 807 cases flp cancer from the years 1910 to 1935 All 778 cases of his cancer which have been accorded to treatment have been followed up to January 1 tou when this investigation was terminated

In the present study the term "lin cancer is med exclusively with regard to cancer arking in the enithelium of the red of the lip In all cave allo cancer in which treatment is at all possible the lot tumor should be treated radiologically Rather small, not too deeply growing cancers can adva-tageously be treated with radium larger turns should be treated with roentgen rays. In cases was operable lymph node metastases the main street should be laid upon the surrical treatment in connection with which both preoperative and per operative rocuteen or teleradium treatment should be given. Ipoperable meta tases should be mind with roenteen rays or preferably teleradom leter stitlal braduation of remnants of metastases cane of be used. Prophylactic roentren treatment of the lymph pode regions is recommended for cases artout namable metastates.

NAME OF TAXABLE VALUE AND

#### PRABANA

Whiteleather J. E.: Transitional Feithelial Gd Carcinoma of the Nasonharron, An J Inst. 1945 54 357

Tran itlenal enabelual cell carcinoma of the repharynx is not a rare disease. If ever the day nosis is often ma ! too late is r succes ful treatment The direct caffeet both males and females of all act and it is exceedingly malignant in children and roupe silult

The most common s te of the primary lesses is in or near the I was of Rosenmueller or in the plants geal torells. One of the earliest symptoms is rein able to obstruction of the custachian tube Later symptoms are referable to a nolynoid obstrocts to the nasopharynt invasion of the transal carm and metastases to the lymph nodes of the neck. D dark metastases are common

Radiation therapy is the accepted methol el treatment and offers the greatest hope at this ture whether it be complete arrest or rulliation. Patents who are treated before metastases or intracranial extension occurs can e pect the best results.

Sixteen cases of transitional epathelial cell cardnoma of the na sopharynx in patients of from 10 b 58 years I age are reported Metastases are present in all but a Six patients are still livme. Of these 3 have the disease and 3 are free of it. \cer of the latter has survived more than 30 months.

JOHN F DELIN MD

#### NECK

Means, J. H : Hyperophthalmorathic Grass Discuss A Int. M 1945 13 179-

Surveying the several phases r types of Gra of disease one may recognize among others, the followiner

- 1 Classic Graves disease, with ophthalmopathy thyrotoxicosis, and gotter
- 2 Graves disease with thyrotoxicosis but no
- 3 Hyperophthalmopathic Graves disease with hyperthyroidism, enthyroidism or hypothyroidism in which the ophthalmic phenomena are the most prominent.

The pathogenesis and etiology of the ophthalmopathy have not yet been definitely established The available evidence indicates that swelling of the orbital contents is a very important, if not the sole, factor concerned in proptosis of the globes. Weak ness of the rectus muscles probably also plays a part and the wide separation of the lids, too may be a factor. The orbital swelling is believed by many to be due to increase in fatt. Although the precise cause of the swelling in the ophthalmopathy of Graves disease has not been established with any degree of certainty it is very evident that the anterior lobe of the plittiatry gland has some relation to it.

From the point of view of diagnosis, the problem is not one of distinguishing between ethologically distinct types but of deciding in any given case, whether the ophthalmopathy or the thyrotoxicosis constitutes the greater menace to the patient. The manifestations which render the eye condition disquieting are those reflecting swelling and muscle involvement—bulging of the lids chemosis of the conjunctiva limitation of the coular movements, and diplopsa Lunitation of upward movement is the most impressive, and probably the most signifi

cant, of the muscle phenomena.

A more difficult diagnostic problem is that of recognizing cases in which the eyes are likely to enter the hyperophthalmopathic phase at a later date, with a view to prophylaris. Males are more prone to develop the hyperophthalmopathic phase than are females. The early occurrence of subjective ophthalmic symptoms should also suggest the possibility of an impending hyperophthalmopathic course. The early occurrence of chemios and in jection of the conjunctiva and of epiphora is also suggestive of the hyperophthalmopathic type whereas marked lid retraction phenomena with little or none of the phenomena due primarily to swelling favor the classic type.

The treatment of the hyperophthalmopathic type is specific and symptomatic. Thyroidectomy should be avoided in cases in which the development of a hyperophthalmopathic course is considered likely Enough cases follow this course postoperatively to justify the belief that the removal of the thyroid plays an important part in initiating it.

The administration of thyroid irradiation of the pitultary gland and administration of substances antagonistic to thyrotropin are among the specific

measures used in treatment.

Symptomatic treatment consists of adequate protection of the eyes, depleting measures (on the theory that edema of the orbital tissues may play a part) measures aimed at improving the strength of the extrinsic muscles and surgical procedures from tarsorrhaphy to enucleation. SAMULL KARN M.D.

Davis E. D. D., Lederman M., Harnett W. L. Woodman E. M. and Others. Discussion on the Treatment of Carcinoma of the Larynx, Proc. R. Sec. M. Lond., 1945, 38, 353

DAVIS reviews laryngofissure for early intrinsic carcinoma of the larynx and compares the results with those in cases treated by radium implantation. radiotherapy or radical laryngectomy. The most suitable cases for laryngofissure excision were those in which the growth was limited to the middle or anterior third of the vocal cord. Extension unward to the ventricular band or into the ventricle was no contraindication to excision, but extension to the subriottic area to the posterior commissure or across to the anterior commissure was regarded as a contraindication to this type of operation. The most successful excisions resulting in cures were those done for epidermoid carcinomas of the Grade z Broders type. All the operations were done under endotra cheal anesthesia with chloroform and ether isthmus of the thyroid was usually divided to facili tate tracheotomy a procedure no longer considered necessary in every case. When tracheotomy was performed the tube was always removed before the patient left the operating room. Extreme care was always taken to insure against the oozing of blood into the larynx. Packing of the larynx with gauze or division of the hyoid bone was considered poor surgery The alae of the thyroid were not removed, but the tissues about them were freed en bloc. In this series there were no deaths. Two of these cases were formerly treated with teleradium but showed recurrences and were then treated by laryngofissure. which resulted in 5 year cures

COLLIDGE recommended routine biopsy because senile tuberculosis mimics epithelioma of the laryny. Broders classification from the biopsy specimen if indicative of a Group IV carcinoma would suggest radical operation rather than laryngectomy After radiation therapy, operative technique may become more difficult and tissue devitalization may result in pharyngostenosis or necessitate plastic operations If radiation therapy fails a radical operation should be done rather than laryngofissure If general physical debility exists, patients are best treated by radiation therapy which should then be regarded as an alternative method. The technique of burying radium needles in the neck should be abandoned in favor of the teleradium beam which can be accurately controlled for dosage and causes minimal or no radionecrosis

LEDERMAN states that radiation therapy in early cases of intrusic excitonoms of the larynx can offer the patient as much as surgery and with less risk. Statistics were presented which matched Collidge's report of 70 per cent and 60 per cent 10 year sur

report of 70 per cent and 60 per cent to year su vivals after laryngofisture and laryngectom; HARNETT reported a series of 122 cases of cancer

HARNETT reported a series of 123 cases of cancer of the larynx not yet published. The sex ratio was

113 males to 10 females. The average age of the patients was 62 years. There were 57 patient with early, cancer of which 13 were treated by raileral surgers and 13 were alive after 4 years. Of the 10 in the latter group treated by palliative methods all were dead of the 10 treated by railium 5 survived and of the 13 treated by x ray 4 were alive. The operative mortality from larvingous ure (12 ca. e3).

wa 8 3 per cent.

Wooman believes that the method of opening a
window into the laryna and inserting radium needles
into the lesson should be defen led and not be alan
do ned. He also noted that x radiation may be given
through the window as a follow-up for recurrence

It is states that the preservation of the patients life rather than his one is build be considered before surgery a recommended. Septile can be better controlled now because of new drugs. Hence the result of radiation therapy will become more striking. After larging 1 ure radiation therapy should be given to decrease the percentage of recutrences.

Nicis reperts that patient treated with x ray therapy do not completely avoid damage to their voice as is commonly believed. They also suffer from the prolonged treatment and x ray reaction Perchoondrist; a complication after foradation Larrynoffs user supers ret ra lation therapy of the mangrance; so of low grad. Patient treated by the

Final Harmer method of radium implantates through a window in the largar made ancrendal recoveries and suffered little radiation acknow.

Wilson's results from either redisberge a surgery did not equal those reported. Whose lish that surgery should never be attempted after enssive radiotherapy. He also believes that there is reliable method of predetermining the radious lishty of a lexion.

Brown believes that surgery should be limited to simple carcinoma of the cord. The most laportist advances in laryngeal surgery consisted of the deination of tracheotomy by means of intubation and the control of bleeding with the cartery point.

CANTELD states that tracheotomy is of gent value because it diminishes the muscular activity of the pharmax and lars na and thereby promotes here healing. Days states that the Harmer Finni operation is superior to other forms of therapy because it entits

he to give the proper design of radium out the area to be treated whereas teleradium and say produces burning of the skin and other completion in the surrounding tissues. Colling said that the local use of radium case

Container said that the local use of radium case an irregular radiation effect and the tumor proper facility receive an homogenous dose

BINI MIN C P SHURROW MD

#### SURGERY OF THE NERVOUS SYSTEM

#### PERIPHERAL MERVES

Spuriing R. G: Peripheral Nerve Injuries. J Am M Ast 1945 129 1011

In the European theater of operations 15 per cent of all battle injuries to the extremities were complicated by nerve damage. If such injuries are mishandled the patient may be left with a useless, aneathetic limb therefore it was extremely important to set up a program of treatment for them

Immediate primary suture of a severed nerve is theoretically desirable, but in practice it is not a good plan because battle injuries are almost invariably associated with contusion of the nerve tissue. The optimum time for end to-end suture is between

the third and the month weeks after injury

It was not always possible to return patients with injury of the peripheral nerves to base hospitals for definitive treatment during the optimum period be cause these miuries were last on the list of priorities for evacuation among neurosurgical cases. These patients usually reached neurosurgical centers in England two to three weeks after wounding Mean while the wounds had been debrided and delayed wound closure done. Most of the definitive treat ment was given in England rather than the United States because the optimum time for repair would have passed before the latter could be reached However, the patients were usually sent to the United States for convalencence. Many serious wound infections or extensive injuries of the soft tissue requiring plastic repair were sent directly to the United States, by-passing England

Several points were outlined for the management of penpheral nerve injuries in the Manual of

Therapy for the European theater

In every wound of the extremities, damage to the nerve trunks must be considered and motor and sensory tests should be made.

2 Even in the presence of nerve injury the wound should be treated as any other soft tissue wound that is, by débridement and delayed closure.

- 3 If severed nerve ends are visualized during the debridement, they should be approximated if possible If the gap is too great to permit this both ends should be anchored to the soft tissue with fine steel or tantalum wire. This is to prevent retraction which sometimes complicates later end to-end suture. Metal sutures aid in later visualization by means of x rays.
- 4. Muscles and fascia should be approximated loosely over the exposed nerve trunk. No pack should be used. The wound should be closed later.
- 5 For transportation splints should be applied whether there is associated bone injury or not.
- 6 The condition of the nerves at operation and the procedure done should be noted on the emergency medical tag or on the cast.

The following principles of nerve repair were

Nerve ends should be trimmed until normal tu bules are visible. The ends should be approximated by epineural sutures with no tension on the suture

Hemostatis must be rigid. The use of a through and through suture (sling stitch) was optional. The recommended suture material was fine tantalum sure on a straumstic needle.

A small cuff of tantalum foil was usually placed over the suture line, although at one installation a

plasma clot (Tarlov's technique) was used

Removable splints were used rather than casts for the correction of deformities due to injuries. Extension of the flexed joint was begun at the end of the second week after operation and was completed by the fifth week.

Physiotherapy was applied both before and after operation Galvanic stimulation of denervated muscles will prevent atrophy and retard fibrosis and, accordingly this measure was used routinely, beginning with 15 brisk contractions daily and progressing to 30 contractions. Massage active and passive motion, and moist and dry heat were also used.

There were 6 245 bettle casualties with major nerve injuries hospitalized between D-day and V E day Of these 46 per cent were operated on over seas. The remainder were evacuated to the United States for definitive surgery usually because the neurosurgical centers abroad were overloaded.

In 47 per cent of the surgical cases the nerve was dound intact and neurolysis usually external was done. In the remaining cases the operation consisted of end to-end suture. The number of insurmountable nerve gaps amounted to 1 per cent, as opposed to the 10 per cent found among the cases in which operation was performed in the United States following the North African campaign. This is important because elective bone shortening to facilitate and to-end suture is not desirable and most nerve grafts are clinical failured.

Early nerve suture possesses three advantages over delayed suture (1) mobilization of the proximal and distal nerve segments is more readily achieved (2) fibroals in the wound, particularly in the nerve stumps, is minimized and (3) flexion of the contiguous joints is more easily accomplished.

The time lapse between wounding and neurosurgery varied from 28 days in the period after D-day to 42 days in the period of heavy fighting before \ E day The average for the whole period was 30 days which was longer than the optimum period but well within the upper limit of 90 days.

Primary wound healing occurred in 98 per cent of the cases, and demonstrated the wisdom of delaying neurosurgery for three or four weeks.

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BRAIN AND HIS COHERTS S CRIFT!

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results he devised a surgical technique which was subsequently modified by Freeman and Watts in 1942. The latter believe that the correct procedure is the division of the anterior thalamocortical fibers, hoping thereby to disassociate the emotional and intellectual components of morbid thought processes

The authors then review a series of cases 100 in number and divided into 40 male and 51 female patients whose average age was 36 (their ages ranging from ro to 53 years). This material in cluded 4 case of melancholas 50 severe obsessional states, 2 epileptics subject to frequent attacks with impulsive outbursts and a general paretic, who having had treatment, developed a chronic hallucaness. The remaining 88 patients were suffering from schizophrenia 54 of them being cata toxic mostly of the excited hyperkinetic type who were sillen and withdrawn from reality although with occasional impetious and violent behavior Judged by ordinary prognostic standards all of these patients were considered hopeless chronic invalids.

The operative technique as described by Freeman and Watis was used throughout the series. From a technique standpoint the operation was a straight forward procedure with few complications the mot tality in the series being 4 per cent. The importance of expert postoperative management is stressed. The impression of the authors that the best results are achieved in cases showing signs of "mental tension is supported by this series. In the schusophrenia group periodic catatonics gave the best results. It is concluded that the value of the operation in certain types of emotional illness has been well paul Merkett, M.D.

Paul Merkett, M.D.

Frykholm, R.: The Treatment of Bilateral Acoustic Tumors. Acts chir result 1945 92 451

The incidence of bilateral acoustic tumors has been a subject of discussion for many years. In 1915 Henschen regarded the ratio of bilateral to unilateral acoustic tumors as being i in 10 Cushing in 1917 believed that many cases of unilateral tumors were not reported and that probably the ratio was closer to 1 in 100. In the clinic of Professor Olivecrona, in Stockholm during the period from 1922 to 1943, there were recorded 341 cases of unilateral and 6 cases of bilateral acoustic tumors.

The author discusses the cases of 54 patients with unlateral tumors, who were operated upon in this clinic during the period from 1937 to 1939. Radical enucleation of the tumor with preservation of the facial nerve was the objective, for in intracapular caudestion the nerve is nearly always sparred

Radical removal of the tumor with preservation of the facial nerve was done in 27 cases with 3 deaths, radical removal without preservation of the facial nerve was done in 14 cases with 3 deaths and intra capsular enucleation was done in 13 cases with 2 deaths.

This vast experience was available in the treat ment of 6 patients with bilateral tumor 3 of whom had a generalized neurofibromatosis. The cases are carefully recorded and it is apparent that they presented many surgical difficulties for 3 of the patients died within 2 months after operation. Frequently operation in two stages was necessary despite the bilateral approach and in no case was a radical removal accomplished on both sides with preservation of function in the facial nerves. The most satus factory result was obtained in the second case already reported in which the patient is alive 17 years after bilateral intracapsular enucleation. In 3 cases, the tumor on one side was radically removed the tumor on the other side was not dealt with Thirteen cases in which surgical treatment was carried out have been collected from the literature.

The syndrome presented in bilateral acoustic tumors is as would be expected except that the condition does not necessarily progress evenly on the two aldes. There is tinnitus nerve deafness, loss of nerve conductivity a beence or diminution of corneal reflexes, and roentgen evidence of dilatation of the internal acoustic meatur. These are followed by cerebellar signs, such as ataxla and nystagmus and finally there is increased intracranial pressure with vomiting and papilledems.

In the surgical treatment of acoustic tumors certain alms and restrictions must be observed

There should be a bilateral approach and the dura should not be closed unless both tumors are removed with their capsules. Complete encleation should be attempted only on a deaf ear Radical removal should not be undertaken if one facial nerve has already been paralyzed. If the patient is completely deaf, both tumors should be radically removed provided the facual nerve on the first side functions a two-stage operation may be indicated.

ADRIUM VERBRUGGHEN M.D.

## MISCELLANEOUS

Alpers, B. J and Forster F M: Arteriorenous Ansurysm of the Great Gerebral Vein and Arteries of the Circle of Willis Formation by Junction of the Great Cerebral Vein and the Straight Sinus and of the Choroidal Arteries and Anomalous Branches of the Peaterior Gerebral Arteries. Arch. New Psychiat., Chic. 1945 54 181

The authors report a case of arteriovenous aneurysm involving the great cerebral vein (Galen) and the arteries of the circle of Willis This patient was an 18 year old male with a history of headaches for 18 years. His neurological study was essentially negative but x rays revealed a calcification in the right parieto eccipital region convolutional indentations of the inner table of the skull and complete destruction of the dorsum sellae and the posterior clinoid processes

Ventriculograms revealed an internal hydroceph alus with a calcified mass projecting into the posterior horn of the right lateral ventricle

Cramotomy was performed and the ventricle opened which revealed a mass of tortuous arteries

roots are cut bilaterally from Ta or Tu to Si local tendon shortening which remains can be cared for by manipulation or tenotomy With splints the flaccid legs can be stabilized to bear weight and with the addition of crutches the patients can learn to ure addition of distincts the patients can learn to walk. Because the bladder no longer empties except when it reaches its critical amount of filling or when deliberately stimulated the patients can remain dry

In the first of such operations attempted success was not complete because of difficulty in identifying the proper anterior roots, which were counted from what proper america none, which were countries from was thought to be S, upward. The patients expired from sepais arising from the urinary tract or bed sores. This has been eliminated in recent years by the use of tidal drainage with solutions M or G as irrigating fluid which also does away with bladder

calculi that otherwise occasionally form In dorsolumbar anterior rhizotomy the spinous process of Tu is identified. A bilateral laminectomy of Thand This done. After the dura is opened, the last teeth of the dentate ligament are identified since the intraspinal nerve which encloses it and leaves by the next dural opening below is the first leaves by the next dural opening below is the first leaves by the next dural opening below is the first leaves by the next dural opening in to S, are then lumbar All anterior roots from In to S, are then sectioned but none below S, should even be cut. If the patient is very deformed the laminectomy can be done in the lumber puncture position Pentothal sodium or an avertin base is the preferred anesthetic

Since the operation is permanently destructive it should be limited to those patients who have and tomical cord transection. The requirements for this diagnosis are complete absence of voluntary motor power complete sensory loss a predominantly flexor

or flexor adductor contraction in the abdominal muscles and in both legs in response to a noxious stimulus applied to the sole of either foot, and the summus applied to the sole of editer 1000, and the emptying of the bladder in accompaniment to this stimulus or other less noxious stimuli. Although the presence of an extensor thrust had been thought in the past to predicate neural cord connections above and below the lesions the author has found that its presence or absence is not necessarily an indication of anatomic cord transection and consequently it has no bearing on whether or not a given patient needs an anterior rhizotomy Ol primary importance is the elimination of infection and the establishment of a good general condition since the lack of a good general condition distorts the neurological status. Ten such rhizotomies have now been performed

by the author with the conversion of spartic para plegs to the flaced type in all cases. Twenty four hour urnary control without eatheter or drainage has been attained in all but 2 cases. Bed sores and pressure sores were healed or arrested in all cases pressure sores were meaned of street have developed before operation Two patients have developed bowel control so that defectation occurs only once a day at a predetermined hour. Three others are well on their way to attaining this end on their way to attaining this end in the others are well author matter and the control of either walking with splints and crutches or learning

Other patients have not been operated on because of the inability to control sepsis or hypoproteinemia, to do so or because of inadequate intelligence on the part of

the patient or ability to get along fairly well in spite of spasticity

and venus in the region of the glomus. More of the ventricle was incised which exposed a mass of vascular abnormalities lying against the tentorium with the vascular stem of attachment toward the midline.

The patient succumbed a days following operation, and necropay studies were done. These revealed an extensive aneutym arising from the junction of the great cerebral vein (Galen) with the straight sinus, and direct communications that the straight sinus and direct communications that the straight sinus sinuspants of the straight sinuspants of the straight sinuspants are straight sinuspants. The straight sinuspants are straight sinuspants are straight sinuspants and straight sinuspants are straight sinuspants and sending branches into the aneutrons.

Only s cases of a similar type of artenovenous aneutyam have previously been reported and both of these were associated with an internal hydrocephalus, the mechanism of which has not been adquately explained Howard A. Browx, M. D.

Gantt, W. H., and Marshall, E. K., Jr.: Toxicity of Sulfanilamide on Higher Nervous Activity Bull Johns Hopkins Heep. 045, 77, 104.

The authors found that the oral administration of large does of sulfanliantic considerably executing the therapeutic does produced a generally depressing action upon the conditional reflexes in dogs. Two dogs with previously well established salivary conditional reflexes and 2 dogs with corebellar motor conditional reflexes and 2 dogs with corebellar motor conditional reflexes and 2 dogs with cerebellar motor conditional reflexes became attails when given 0.5 gm of sulfanliantide per kilogram of body weight. The diminished conditional reflexes returned to normal the day following the experiment and there was no permanent impairment of cortical function.

Speigel, I J., and Lewin, P : Tourniquet Paralysis.

J. Am. H. Att., 1045, 120, 432

The authors believe that paralysis of a peripheral nerve follows the application of a tourniquet for hemostatic purposes more often than would be suggested by review of the literature. The reason for this is that most of the lessons produced by the tourniquet are only transitory.

niquet are only transitory.

Three cases of peripheral nerve paralysis presumed to be due to application of a fourniquet are described in detail furthermore in each case the particular nerve involved was surgically explored and visual isced. Neuromas were found on the nerve in a cases with thinning of the nerve structure below the lesion and in the third case the nerve was found to be embedded in soar tissue. The beson was so extensive in a sill of the cases that end to-end suture could not be accomplished because of the long length of nerve that would have to be sacrificed and it then seemed that the peripheral nerve injury would be permanent. Pathological investigation of the nerve lesion was not feasible for none of the nerve was removed. The time of operation was relatively uncertain but fin?

cases the tourniquet was supposed to have been plied for approximately 114 hours and m the fin case for approximately xx minutes.

In spite of these lesions the tourninger has a considered a very important adjunct in surpol mocedure on tendons nerves bones and joint

ADMINI VERMICICALES MIN

Munro D: The Reinbilltation of Patient Tent Paralyzed Below the Waht, with Speed let erence to Making Them Ambulatory as Capable of Earning Their Living. It Exp. J. M. 1945, 133, 453.

With proper treatment all patients with him, a the spinal cord who are intelligent, co-openire, an have the use of their shoulders, arms, and had or be made to live a socially useful entirest.

Among a series of say patients with thereich, but or a start ord detaces observed at the base City Hospital 59 cases were analyzed Tey-chosen according to the following criters we tient must have lived 90 days after the cost of disease he must have been rendered hospake doing gainful work and the lesion must have below the second thoracide level. The present aid is concerned only with complete anatonic traces too of the cord.

Following recovery from spinal shock, patent with anatomic transection develop a mass min or "maximal flexor response to a minimal sensor stimulus , provided the state of nutrition is good as no major infection is present. This refler counts dorsification of the great toe flexion of the anile re knee and adduction and flexion of the hip. It flexor and extensor tendon reflexes are both lype active the flevor muscles are hypertonic while the extensors have normal tone. In addition there contraction of the abdominal muscles, which sta ulates the urinary bladder and causes it to enge regardless of the amount it contains. The are leaves the bladder so rapidly that even if an bhy catheter is in place it escapes around it. Thus, the patients cannot be kept dry as long as the ser reflex remains active and since they are constant wet, bed sores remain a problem. The boxes is empty at unpredictable intervals so that the paties is always soiled with feces.

is a may a source with reces.

However if it he mass reflex and its effects orbicounteracted, the patient can be made analysis with splints. The bladder and bowers can also brought under sufficient control so that the person be trained to get through the night when can be trained to get through the night when setting were and through the day without reflex solded or having to empty his bladder more than every three hours.

The mass reflex is best eliminated by the kirs spinal division of the anterior spinal root. The stateds the logical point, the motor side of the rich arc, and converts the byperionic spiral capacity int a flaced by parapelgis. It also begin massed as the reflex activity to the abdomain massed as bladder and thus controls the latter. All anterio roots are cut bilaterally from T<sub>m</sub> or T<sub>m</sub> to S<sub>1</sub>. Any local tendon shortening which remains can be cared for by manipulation or tenotomy. With splints the flaccid legs can be stabilized to bear weight and with the addition of crutches the patients can learn to walk. Because the bladder no longer empties except when it reaches its critical amount of filling or when deliberately stimulated the patients can remain dry

In the first of such operations attempted success was not complete because of difficulty in identifying the proper anterior roots which were counted from what was thought to be S<sub>a</sub> upward. The patients expired from sepsis arising from the urinary tract or bed sores. This has been eliminated in recent years by the use of tidal drainage with solutions M or G as impating fluid which also does away with bladder calcult that otherwise occasionally form.

In dorsolumbar antenor rhizotomy the spinous process of T<sub>11</sub> is identified A bilateral laminectomy of T<sub>11</sub> and T<sub>11</sub> is done After the dura is opened the last teeth of the dentate ligament are identified, ance the intraspinal nerve which encloses it and leaves by the next dural opening below is the first lumbar. All antenor roots from T<sub>11</sub> to S<sub>1</sub> are then sectioned but none below S<sub>2</sub> should even be cut. If the patient is very deformed the laminectomy can be done in the lumbar puncture position. Pentothal sodium or an avertin base is the preferred anesthetic.

Since the operation is permanently destructive it should be limited to those patients who have and tomical cord transection. The requirements for this diagnosis are complete absence of voluntary motor power complete sensory loss a predominantly fixor

or flexor adductor contraction in the abdominal muscles and in both legs in response to a noxious stimulus applied to the sole of either foot, and the emptying of the bladder in accompaniment to this stimulus or other less noxious stimulu. Although the presence of an extensor thrust had been thought in the past to predicate neural cord connections above and below the lesions the author has found that its presence or absence is not necessarily an indication of anatomic cord transection and consequently it has no bearing on whether or not a given patient needs an anterior rhizotomy. Of primary importance is the elimination of infection and the establishment of a good general condition since the lack of a good general condition distorts the neurological status

Ten such thizotomies have now been performed by the author with the conversion of spastic pars plegia to the flaccid type in all cases. Twenty-four hour unnary control without catheter or drainage has been attained in all but 2 cases. Bed sores and pressure sores were healed or arrested in all cases before operation. Two patients have developed bowel control so that defecation occurs only once a day at a predetermined hour. Three others are well on their way to attaining this end. In the others sufficient time has not yet elapsed. All but 2 are either walking with splints and crutches or learning to do so.

Other patients have not been operated on because of the inability to control sepsis or hypoproteinemia, or because of inadequate intelligence on the part of the patient or ability to get along fairly well in spite of speaticity.

ROWER E. GREEN M.D.

# SURGERY OF THE THORAX

#### CHEST WALL AND BREAST

Daland, E. M : Some Unusual Aspects of Cancer of the Breast N England J M 1945 233 515

From previously collected data the author found that there is a much greater life expectancy in patients with carcinoma of the breast who are oper ated upon than in those who go untreated. A radical mastectomy is considered much superior to a simple mastectomy is reserved as a palliative measure, but x ray therapy is considered better than simple mastectomy. X-ray therapy is not tolerated well by elderly patients and this group is treated by simple amputation of the breast if a radical operation is considered too formdishle.

Three cases of carcinoma of the breast in patients under 19 years of age are reported, also a recurrence 34 years after radical mastectomy and 2 cases of penistent recurrence of low grade cancer over periods of 24 and 10 years respectively.

EARL O LATHER, M.D.

Röden, S.: On Cancer of the Breast, with Special Reference to the Results of Different Methods of Treatment. Acts radial Stockh 1944 57 5

The author has exhaustively studied 343 cases of carcinoms of the breast treated between 1911 and 1933 The patients operated upon in 1928 and later have generally been subjected to annual examina tions. The material was classified according to Steinthal group I (SI) small and slowly growing larger tumors not fixed to the surroundings and without microscopic metastasis to the axilla group a (SII) tumors with axillary metastasis as disclosed by microscopic examination their size being too limited to be classified in Group 3 group 3 (SILI) large and rapidly growing tumors fixed to the skin and under lying tissue with axillary metastases also all tumors with metastases in the force supraclavicularis and further away. There was a total of 141 cases (SI max SII mad and SIII 44)

Operative treatment was given according to Halsted's technique. Electrosurgery was used in 10 cases only. There was a primary mortality of 2.6

per cent.

X my therapy has changed throughout the years and on the whole the donage has been increased. Ara rule, therapy can be confined to two fields. The radiation is arranged tangentially to the wall of the breast to lessen the rask of radiation lesions of the lungs. The treatment includes one preoperative and three postoperative series.

There were 127 patients treated by operation alone, 98 by operation and postoperative roentgen treatment, and 118 had roentgen treatment before and after radical surgery

Of 59 patients in group SI treated by surgery alone 78 per cent survived 5 years and 55 s per cent survived to years. After to years death due to eace, causes was as frequent as death due to causer. Of patients in group SIH treated by operation alone, if died within a years.

Of 38 patients in group SI given postopeni, a irradiation, 71 per cent survived 5 years and 48 per cent survived 10 years of 51 in group SII, 153 per cent survived 5 years, and 13 3 per cent survived 6 years, and 13 3 per cent survived 10 years and of the 9 in group SIII none survive more than 3 years.

The patients treated by imalistion prespensing and postoperatively included & B in group SI is group SI and 18 in group SIII of the six group oper cent survived y years and 76 year cent servived y years and 76 year cent servived y years, but the figures (or to year at most year, but he figures (or to year at most years) and 9.78 per cent survived y years and 9.78 per cent survived y years. Other in group SIII none survived for years. The strength is all cases whether the patient died of case or from other causes.

The location of the tumor in the breast in reints to its degree of malignancy was a follow; (1) ago lateral quadrant,  $s_1 \in (4.8\%)$  cases less malignat and go (6.3.4%) more malignant (2) upper moisi quadrant,  $s_2 \in (3.8\%)$  cases less, and  $g_2 \in (4.8\%)$  cases more malignant (3) lower lateral quadrant (6.0.8%) cases less, and  $s_2 \in (6.0.8\%)$  cases less, and  $s_3 \in (6.0.8\%)$  cases less and  $s_3 \in (6.0.8\%)$  cases less, and  $s_3 \in (6.0.8\%)$  cases less and  $s_3 \in$ 

Data were available in 150 cases of neutron: de cases had recurrence or regional mentatuses and passes had datant metatuses. The recurrence as regional metastases made their appearance on average of 16 months after operation while the famouths. The patients in the group SI developed recurrences or metastases appeared in an average of 10 months. The patients in the group SI developed recurrences or metastases later than those is group SII as avoidable expected.

EARL O LABORE, M.D.

## TRACHEA, LUNGS, AND PLEURA

Consnt, J. S., and Dale, G.: Closed Extrapleari Pneumonolysis. J. Therac. Surg. 945, 14 JH

Closed intrapleural pocumonolysis established self as a safe and technically satisfactory morder which from hemorrhaps edisson and substance emphysema the complications vary little from the occurring during the course of meanocharat then pin patients without adhesions. The procedure is a very low mortality. There is less information, he were regarding the technical results and completions of extrapleural dissection of short pelmona attachments and those to which portions of the heat are adherent over a relatively wide area.

The author's report is based on 50 operators a which some degree of extrapleural dissection superformed. They represent all instances in helthis procedure was used in 143 consecutive intra pleural pneumonolyses The attachments in these 50 cases were unsuitable for division by the accepted certeria for intrapleural pneumonolysis and under ordinary circumstances these cases would not have been explored It was possible to obtain satisfactory collapse in 35 or 70 per cent of them by extrapleural collapse in 35 or 70 per cent of them by extrapleural collapse in 36 or 70 per cent of them by extrapleural collapse in 35 or 70 per cent of them by extrapleural collapse. achieved in 37 cases. If the number performed for ex horatory purposes (13) is omitted the operation morecoded in 5t of 37 cases or in 84 per cent of the

cases in which an extensive or complete dissection No postoperative fluid was noted in 26 cases Transient effusion occurred in 15 instances Twenty was possible. operations were followed by temperatures of over

100.4 F which lasted no more than I week except in the instances in which bloody effusion and staph ) lococcurs empyema occurred The latter was probably the result of damage to the lung parenchyma in the extremely firm short band Closed drainage was

Considerable postoperative bleeding followed the operation in 3 of the patients who had partial disnecessary section (23 per cent) and in 3 patients in the other two groups (8 per cent) These percentages suggest the various natures of the attachments The patients with attachments which after exploration are found to be too dangerous to dissect also appear to be the ones associated with the greater percentage of postoperative hemorrhagic effusion, even though the operation is not persisted in When extensive or complete dissection is possible postoperative ooxing quently vascular and it is suggested that the normal is rather infrequent respiratory tug at the denuded line of attachment when exaggerated by coughing and occasional vom iting has the opportunity of rupturing vessels and lossening the congulum following cautengation of

There were 6 cases of empyems 5 of which were the bleeding points tuberculous All of them developed 4 or more months after the procedure One case of staphylococcus aureus empyema occurred postoperatively

As to the technique a new type of sponge carrier and dissector previously described by the authors was used in 45 of the 50 operations. The Corylles pneumonolysis unit was used in nearly all of the

Brantigan O C.: Resection of the Lung in the nugan U U: Resocution of Lang in the Treatment of Pulmonary Tuberculosis. Arch

Tuberculosis is a systemic infectious disease caused by a specific micro-organism. It most often lavolves the lung and is usually bilateral, but, fortunately the major disease area is predominantly unllateral and often unilobar The application of adequate medical measures supplemented by simple surgical procedures will arrest or cure carly pul monary tuberculosis in most cases. Often in the later stages of the disease irreversible structural

changes occur in the bronchisl system and cause the failure of simple therapeutic measures

Accurate diagnosis is extremely important in recognizing irreversible structural changes in the lungs and bronchial system The use of tomog raph) bronchograph) determinations of intra cavitary pressure bronchoscopy bronchospirom ctry and diagnostic pneumothorax as indicated will lead to the correct diagnosis of pulmonary Only with an accurate diagnosis can the outcome of surgical treatment be predicted

Pulmonary resection is the only form of treatment that can be used effectively when pneumothorax or phrenic paralysis with or without pneumoperi toneum does not control basilar disease a cavity against the mediastinal surface in the lower half of the chest, or a cavity in the middle portion of a lung The isolated tuberculoma represents a localized form of pulmonary tuberculosis and it is perhaps the only condition in which all of the diseased tissue can

Controversy is invited when lobectomy is suggest ed for the treatment of a tension cavity and of unibe excised lateral or unilohar disease in a young person. Real contention and perhaps just criticism are encounter ed when lobectomy of the upper lobe is elected as the

method of treatment instead of thoracoplasty The criticism of elective lobectomy of the upper lobe for tuberculosis must not be allowed to react generally against pulmonary resection for tuber culosis. Good results in the whole field of medical and surgical practice depend primarily on the treat ment instituted early in the course of any disease.

Nine cases are reported in which resection of the lung was indicated for the treatment of pulmonary tuberculosis. One case resulted in death patient had been subjected to a bilateral pneumothorax and a thoracoplasty in a period of 8 years, before undergoing lobectomy performed a year after the final stage of the thoracoplasty was done. If the fadure of the thoracoplasty could have been pre dicted after the failure of the pneurothorax, pneu monectomy could have been performed as a primary type of treatment In 1 of the cases in which removal of a tuberculoms was included excellent postopers The remaining 7 cases showed that the patients were definitely benefited tive recovery occurred even though the disease was not cured in every case In 5 of the 9 cases reported the patients had endoin 5 of the o cases reported the patients had empo-bronchial disease. When tuberculous disease of the bronchial stump occurs, there is always the danger of the formation of fistules months or years after the operation Endobronchial disease often responds to the bronchoscopic application of silver nitrate even when an infected lung is distal.

Dissection of the bilar structures, which permits individual ligation of the pulmonary artery and veins and also adequate suture of the bronchus with silk, has greatly reduced the development of bron chial fistulas. The dissection in persons with tuber culosis has been uniformly easier than dissection in persons with other pulmonary conditions which re

quire lobectomy or pneumonectomy. Unfortunate by tuberculous disease often a located un the upper portion of the lower lobe which places it at the region of the incomplete feasure. As every effort must be made to avoid cutting into tuberculous tissue, the resection, therefore, must frequently be carried into the remaining healthy lobe. Technically it is often less difficult to do a pneumonectomy.

No drainage is used in cases of pneumonectomy and lobectomy of the upper lobe, since there is no method of immediately obliterating the pleural space. Two grams of sulfanllanide and from 190 to 500 cc. of chloroszodin (1 to 3,300 in sodium tetradecyl sulfate (1 to 500) are placed in the pleural cavity for bacterickial effect. The same drugs and solutions are placed in the pleural cavity when a lobectomy of the lower lobe is done even though it is drained. If the remaining lobes are freed completely from the parietal pleura the pleural space can be obliterated quickly by the use of a low negative pressure suction apparatus. Obliteration of the pleural space usually will prevent both propenie and tuberculous infections. It also offers some assurance against opening of the bronchiel stump

Ether or gas or oxygen and ether (given intra tracheally) is preferred for the anesthesa. One must try to prevent the aspiration of secretors into the other parts of the lung. After operation the patients are given carbon doxide inhalations and encouraged to cough and move frequently in order to forestall pulmonary complications. The patients receive 500 c.c. of whole citrated blood s4 hours before opera tion and from 500 to 1000 cc. of blood during the operation. They are placed in an oxygen tent 34.

hours postoperatively

The necessity or desirability of thoracoplasty following pulmonary resection must be considered seriously. Overdistention of the remaining pulmonary resection must be considered seriously. Overdistention of the remaining diseased lobe, whereas with thora copiasty it is well known that collapse of the apical region brings about relaxation throughout the whole cheat and favor continued healing of any remaining diseased area. On the other hand, it should be clearly recognized that the best results from lobect tomy in tuberculosis will come from treatment of early or midmial lesions. Lex Puller M.D.

Smyth, C. J., and Billingslea, T. H.: The Treatment of Lung Abscesses with Penicillin. J Am 11 Am 945, 129 005

Cases of lung abscesses treated with penicillin previously reported are reviewed and 4 new cases which the authors observed during the past 20 marks are reported.

months, are reported
Thirty-one cases of lung abscesses treated with
penicillin had been found in the literature, of which
13 were cured 8 improved and to aboved no im
provement. A table summarating these cases and
including most of the pertinent data presented in the
original report is given.

The 4 patients with lung abscuses who were observed by the authors made satisfactory recommended in transport to the following the long continued intrammediate sheet acres is returned to the following the continued in the following the continued in the continue

From the authon experiences and the report of others, it seems probable that many source lay others, it seems probable that many source lay others, it seems probable that means. In the draze according a stocease in which there is seems to be a seem of the probable of the seems of the seems

Extl. C. Rommers, M.D.

#### Poppe, J. K.: Limitations of Penicillin in Lapyerna. J. Am. M. Agr., 945, 189, 435.

Penicillia has undoubted value in prevatue empreus when it is administred in large quattes during the inciplent stages before fruit pas in formed. This is true especially of postpuenose pleural effusions of the pneumocococ type. Pet cillin is also of value in cases of potential containtion of the pleural space following surpical palacour resection and trummatic insuries of the hast.

The period of greatest value, however appear is be during the incipient stages of the infection prefer ably even before a pleural effusion has developed h is also valuable during the developmental stages of a pleural effusion when the fluid remains this sad clear with relatively few pus cells and a sterk culture. The formation of fluid and positive culture should decrease rapidly within a few days if the penicillin treatment is to be successful in preventing an empyema. The best results seem to ke obtained by a combination of parenteral and himpleural administration of the penicillin, with emplet placed on the parenteral route. Intrapleural ministration alone has not proved adequate. The use of penicillin to avoid drainage of a collector of thick intrapleural pus appears to represent poor judgment and undue optimism. Admittedly the can be rendered permanently sterile in a certain number of cases with tremendous doses of penicilia carried out over a long period of time at great espense to the patient for both the penicillia and hospitalization The most discouraging part of soci treatment is the tendency toward an umatisfactory result, even after the time effort, and money have been expended.

A trial of a or 3 weeks with daily penicillis doarpy of over 100,000 units plus intrapleural layerious of penicillin in the presence of a plearal effusion seen sufficient in most of these cases of potential empress By the end of this time e ther the infection should be completely cured or the empress drained if spain

and symptoms of intrapleural infection persist More than a week of hospitalization will still be required after the penicillin has been stopped in order to watch for latent empyems of which the symptoms have been masked by the penicilin action three per cent of Poppe's cases represent recurrences which developed 1 or 2 weeks after the penicillin

A sterile, dry nontoxic empyema cavity following the administration of large quantities of penicillin was stonned over long periods of time represents one of the most difficult problems. It simulates the unexpandable hing familiar to those dealing with tuberculous pleural effusions associated with artificial pneu

The author a experience with penicillin in over 150 carefully evaluated cases of pulmonary infections of mothorax. all types including empyemas lung abscesses, and bronchicctasis has shown that penicillin does not alter the surgical principles of treatment in any way Pus must be drauned after it is definitely established and chronically diseased tissue which is irreversibly

damaged and replaced by scar tissue must be excreed Patients who have been cured of their empyemas by penicillin should be carefully observed for at least a two weeks period for a possible recur rence. Any toxic or nontoxic turbid pleural effusion containing polymorphonuclear cells following a pyggenic infection treated with penicillin should be surgically drained even though the pus is sterile on

Indications for Surgery in Penetrating culture. Chest Wounds. Brit. If J 1945 2 521

The most important object in the treatment of lajures involving the pleura is early pulmonary ro-expansion By this means pleural infection will be limited and respiratory efficiency restored evidence, however, suggests that the prognous of penetrating wounds is influenced as much by the

condition of the lung as by that of the pleurs. Expansion of the lung is slower after penetrating wounds than after nonpenetrating wounds, irrespec tive of the presence of infection In both hemothorax and hemopneumothorax, pulmonary re-expansion is less rapid after penetrating wounds. In total hemopneumothorax the prognosis is good in the case of nonpenetrating in juries but after penetrating wounds the chances of persistent pulmonary collapse are high even in the absence of infection. This is the type of case which most frequently calls for surgical evacu atton of the pleural hematoma In most cases this difference is due to pulmonary injury which is not always recognized and treatment directed to the pleurs alone will not always result in re-expansion of the lung Difficulty in resolution of the hemopneu mothorax nearly always means pulmonary injury

The prognosts of penetrating wounds, moreover is with bronchopleural tistula. worse than that of nonpenetrating injuries because pulmonary re-expansion is slower and pleural infec tion is more likely Elimination of the pleural space

is of such significance that it is reasonable to regard early pulmonary re-expansion as even more impor tant than avoidance of infection. The former is a more useful means of promoting the latter and the prognosis of localized basal empyema is much better than that of persistent total hemopneumothorax

Pulmonary contusion and laceration on the other even if the latter remains sterile. hand are important causes of delayed expansion of the lung and are nearly siways found in the condi

Penetrating wounds of the upper lobe have the tion of unresolved hemothorax worst prognosis and are nearly always present with total or apical unresolved hemothorax If this per sists for more than two weeks surgical evacuation is indicated in all cases except those of basal hemo-

The main principles of treatment of penetrating wounds therefore are early elimination of pneumothorax thorax and hemothorax and early surgical débride ment of large wounds of the lung and pleurs STEPHEN A. ZITMAN M D

# HEART AND PERICARDIUM

Trent J C.: Surgical Therapy on the Patent Duc tus Arteriosus Report of 5 Cases. Arch. Surg

A patent ductus arteriosus is a constant threat to life if allowed to persist. The early diagnosis of un complicated patent ductus arteriosus is important, therefore and can be made in almost 100 per cent of the cases if the following criteria are present (t) ma chinery murmur (2) thrill in the pulmonary area (3) enlarged pulmonary artery (4) enlarged and pul sating pulmonary versels (5) enlarged heart (6) in creased pulse pressure (7) stunting of growth (8) absence of cyanosis and clubbing of fingers (9) normal electrocardiogram and (10) a history of heart disease from early childhood Not all these criteria

The presence of a machinery murmur is listed by may be present in every case. most observers as essential for the diagnosis though in rare instances the diagnosis may be made without it, such diagnoses remain open to question

until proved by autopsy or operation.

Surgical therapy is not applicable in all cases of patent ductus arteriosus. As a rule only in those cases in which the patent ductus is uncomplicated by other serious developmental defects is ligation suit

All methods employed to date, short of complete division of the ductus are attended by a certain number of recurrences. Simple ligation with silk wrapping the ligated duct with cellophane in the hope that the fibrosis thus promoted may cause per manent obliteration of the lumen ligation and divi son of the ductus, each has its good points and hazards

Ligation of the duct with cellophane offers the saf est and most efficient method of occlusion. Hence prophylactic ligation of the uncomplicated patent ductus arteriosus by qualified surgeons offers the possibility of a normal life expectancy to many patients who otherwise have little hope of living beyond the age of forty STEPHEN A. ZENKAN M.D.

## ESOPHAGUS AND MEDIASTINUM

McHenry L. C.: Benign Esophages! Strictures. J Oblahems M Ass 945 38 469 Benign esophages! strictures are caused primarily

by cicatricial contracture of the esophageal wall as a result of injury and healing processes. These injuries are caused most frequently by corresive chemicals. at times by foreign bodies, by instrumental trauma, by ulceration from severe infections such as typhoid fever and by peptic picer Household lye, which is composed of 95 per cent sodium hydroxide, is by far the most common causative agent. Small children attempt to drink such solution or find the dry pow der and mistake it for sugar Adults at times ingest these caustive substances by mustaking them for some medicament and at times attempt surride by purposeful ingestion. First aid measures such as dulate vinegar or lemon fulce with large amounts of water must be administered very quickly to limit appreciably the extent of the injury. By the time the doctor sees the patient the damage has already been done. Immediate treatment can then be only pullia tive and supportive. Under proper care the patient may get along fairly well for from two weeks to two months when swallowing becomes more difficult or even impossible because of secondary closure of the exophageal lumen. The ulcerations may be healing and the closure be caused by fibroals and contracture Secondary infection may have caused increased swelling granulations, and even further extension of the tissue damage. This will of course, eventually result in more extensive fibrosis as healing occurs.

Treatment must be directed first toward preserving the life of the patient, second toward maintain ing hig seneral state of beath so that he may heat his lesions, third toward maintaining a patent esopha goal lumen and last toward restoring this lumen to a succompatible with relatively normal esophageal.

function.

If the patient is in shock he must be treated generally for shock as in any serious injury. Furenteral fluids are usually necessary to maintain fluid belance and prevent acidons. If there is definite laryngeal obstruction tracheotomy may be necessary. The use of gentle mechanical suction to remove produce a cretions from the mouth and threat is very helpful Keeping the mouth clean not only makes the patient more comfortable but helps prevent stagnation of infected mouth secretions. Heasures such as pencillan and the sulfonamides to prevent secondary infection are of definite value. If the patient does not begin to swallow liquids within a very few days the performance of a guistrostomy will make possible.

If the patient can be persuaded to swallow a thread and to let the thread remain in place he will

the maintenance of nutrition.

never develop complete occlusion of his explore. Attempts to keep the enoplayed lumen open by it use of catheters, Levine tubes, or bouges dong stage of acute ulceration are at times recognition at they are dangerous and add an element of turns to the pathology already present.

Estimation of the degree of damage to the cookgas and of the extent of healing is made by any study and by esophageocopy. The latter must be done very cautionally and usually only the moproximal portion of the involved area can be visualized.

Once the ulcerations are healed or nearly healed, the problem of obtaining and maintaining an air quate esophageal lumen must be considered.

Dilatation of the strictured esopharus is obtained by passing bougies through the exophagus is gud ually increasing sizes. Eventually almost all care can be restored to practical function. Except to very mild injuries a lumen of normal size and fed bility is rarely attained. There are several methods of dilatation commonly used. The most easily used is sample peroral passage of bougges made for the h the exophagus It is rightly called blind bouguage in that the operator cannot see that the boure is engaged in the lumen of the stricture. There are ally a dilated area above the stricture and the s often sacculated with the small lumen lying on the side wall of the sacculation. A blindly meeted bouge is apt to implage on the thin wall of the sacrelation rather than enter the lumen and if an appreciable amount of force is used perforation will resid. This method is the least effective and the most disgerous of any under consideration. Peroral passes of bouges through an esophagoscope is used a clinics where facilities and trained personnel are available to perform frequent esophagoscopies. method used almost entirely in several excelest clinics is the passage of bougles over a string which the patient has swallowed. If sufficient strug s swallowed to pass well into the small intestment may be drawn sufficiently taut so that a book passed downward over it will be certain to engur in the lumen of whatever passage is present through the esophagus. The fourth method of dilatation was devised by Gabriel Tucker and is known in retrograde bouginage it necessitates a large gastrotomy The patient wears the string continually ore end being brought out through the abdominal and the other through the nose and the ends bed

The authors have studied the records of 51 pttients who have suffered burns of the crophages. There were no patients under 1 year of age Over one-half of the patients were 3 years of age or Gastrostomies were performed upon 38 younger crasted by direct bouginage only Usu ally the bougle was passed through a larry goscope or coppagoscope with visualization of the proximal stricture. Frequently, after initial visualization of the stricture simple blind bouginage was employed Seventeen patients were treated by retrograde dilata Eleven patients were treated by both tions only Eleven patients were treated of the series had no dilatations methods Many of the patients are treated over long periods of time the average for the series being just over forty months The longest period of treatment was eleven years Eleven patients, just over 17 per cent of the series died from various causes while under observation Eight patients 153, per cent died of perforation of the exophagus by bouges Four of these were perforated on the first attempt to get a houge through their esophagus. The authors be lieve that at least a portion of this mortality might have been prevented if early gastrostomies had been done and no attempt made to dilate the csophagus until healing of the ulcerations had taken place

Approximately 75 per cent of the patients are eventually relieved of their obstructive symptoms They lead normal lives and except that they must be very careful to masticale their food thoroughly

Abbott, O. A. Abnormal Esophageal Communications Their Types, Diagnosis and Therapy get along very well. J Thorse Surg 1945 14 382

Abnormal acquired fistulous communications may occur from the esophagus into the bronchial tree pleural cavity mediastinum pericardium, and more remote tissue spaces. The etiology of such conditions depends upon the same factors which may cause fistulas elsewhere namely malignant tumors in flammatory diseases trauma and possibly predisposing congenital abnormalities Carcinoma of the ecophagus and bronchial tree, and malignancies of neighboring structures such as the thyroid and mediastinal glands constitute the most frequent cause of esophageal fistula formation. A fistula may develop in conjunction with an esophageal diver ticulum. Such a diverticulum is most likely to be of the traction or acquired type so that the diver tienium itself plays a secondary rôle in the actual ethology The types of traums which are found reported include gunshot wounds the ingestion of sharp objects crushing injury to the chest, penetra tion by bone fragments and surgical procedures such as bouge dilatation esophagoscopy and anas-

An exophageal fistula presents a serious hazard to the patient a life but not necessarily a hopeless one The author's report adds 6 permanent closures to the 15 previously recorded. Two unusual cases of esopha gopericardial fistulas are included in the reports Another case in which a fistula between the csopha gus and the traches occurred in association with

Hodgkin a disease is described and in this the com munication was successfully treated

The history of choking paroxysms on the ingestion of fluids is the most dramatic and suggestive diag nostic symptom especially when it occurs in rela tion to fluids rather than solids The latter may easily slip past a relatively small aperture Dys phagia is a frequent precursor of the complication The patient may describe the ability to swallow fluids without discomfort when in certain positions The disgnostic measure of greatest value consists of x ray visualization of the fistula preferably with lodized oil to prevent benum irritation of the lung countered in trying to visualize these communica tions directly with the aid of the esophagoscope but the instillation of methylene blue within the csopha gcal lumen followed by bronchoscopic examination can be a helpful measure. In cases wherein the fis tula empties into the pleural cavity or through this route to the body surface one should look for the presence of food particles yeast cells or the appear

The fundamentals of therapy are first, the main ance of ingested dyes tenance of nutrition and second appropriate drain age Many fistulas will disappear apontaneously under this management provided the chology is non cancerous Specific local therapy may consist of topical applications or a direct surgical approach. The question of when to resort to usual nesal tube feedings and when to resort to gastrostomy may be a vital one It would appear that a primar, trial on nasal tube nutrition is indicated in all instances if a tube can be passed From the frequency with which coughing paroxysms may be initiated on each gastrostomy feeding the advisability of jejunostomy is suggested as a preferable procedure in some cases This is more mandatory when the lesion is low in the csophagus or at an csophagogratric anastomosis

In view of the 1 successful result noted and 4 others mentioned in the literature topical applica tion of a strong cautering agent should be given a trial in esophagobronchial fistulas not accordary to malignancy Should all other measures fall and sur gery appear to be indicated, then jejunostomy should be instituted along with satisfactory thorn cotomy drainage at the time of repair In lesions secondary to tuberculosis the outlook is extremely poor In view of the secondary invading organisms, open drainage appears mandatory and this should be done anteriorly to allow subsequent thoracoplastic measures as a means of fistula closure. Furthermore in consequence of the chronicity of these lesions gastrostomy or jejunostomy should be an early con

Boros, E.; Carcinoms of the Eaophagus. A Survey of 332 Cases. Gastroralersloty 1945 5 106

Carcinoma of the esophagus is one of the most common of all malignant diseases. The tumor is invariably primary and is most frequently found in the male perhaps because of the greater use of alcohol, and tobacco. It is a brease of midble at though cases of persons aged 19 as well as 90 have been reported

Analysis of the types of cells constituting the tumor showed them to be squamous carcinomas (78%) adenocarcinomas, and undifferentiated car cinomas. On gross examination the tumor can be differentiated into scirrhous, medullary and papil

lary types.

Unfortunately subjective as well as physical evi dence of the presence of an esophageal tumor does not become manifest early. The symptoms are obscure until considerable growth has occurred and loss of weight and strength are little manifestations. Obstructive features often bring to light the nature of the silent process. Glands in the neck may be the first signs, and esophagoscopy should be performed when a doubt exists, but unfortunately the results of the examination are not always satisfactory

The most prominent symptoms in the order of frequency are dysphagia pain weight loss vomit ing hoarseness bleeding and coughing

While the outlook for the patient with esophageal carcinoma is practically hopeless impetus in the direction of surgical management has been forthcoming Boros summarises the operative treatment of 7 patients on whom a total extirpation was at tempted. The lesions, however were found to be inoperable. Gastrostomy was performed on another group of 168 patients, whose subjective complaints such as swallowing were relieved but no prolonga tion of life was obtained. The mortality was 25 per cent, and it was questionable how much real benefit was obtained from the operation.

Dilatation of the narrowed esophageal lumen has given satisfaction, and its mortality is low Dilata tion with the Plummer dilator accomplishes the desired end of enabling the patient to eat and carries

little attendant risk.

Among the 80 patients subjected to intensive radiation therapy in this series only occasional improve ment in deglutition was observed. The improve ment however was not sufficient to warrant the inference that such could be expected with any measure of certainty as a consequence of the treat ment. For the most part there was but little gross change, and the tumor mass showed no signs of shrinkage when compared with the esophagoscopic observations made before treatment. On the contrary congestion and edema became more pronounced. The length of life of the patient after radi ation therapy ranged from 1 to 11 months.

In spite of everything so far devued, carcinoma of the esophagus is practically always fatal and the results of surgery have been almost uniformly had STEPHER A. ZIEMAR M.D.

Norris, T St.M : Through-and Through Bullet Wounds of the Mediastinum with Recovery Laucet Lond., 945 \$49 464

Three cases of through and through bullet wounds of the mediastinum are presented from a series of 11

penetrating wounds of the chest. One of the tr patients died but not 1 case of bemotherax because infected It is interesting to note that all of the cases except 1 were seen within a few hours of injun

Case 1 presented a through-and-through bale wound of the chest. Serum was given by latteress drip On the seventh day a roentgenogram of the chest showed a right hemothorax and a hemore cardium. Aspiration of the perfounding was performed and only a small quantity of partially dotted blood was obtained. The patient was out of below the twelfth day. He was evacuated on the tweetfifth day Three weeks after the injury a roestgragram showed the heart shadow to be normal and the lung fields clear

Case 2 presented 2 through-and-through billet wounds of the chest. The patient s general condition was grave. A blood transfesson was given Esamination revealed a right hemotherax. A needs was passed into the right chest on the eleventh by and to ounces of sterile fluid blood were assested Fifteen ounces of sterile fluid were aspirated on the fourteenth day. The patient was evacuated on the seventeenth day. Two months after minry it an reported that the patient's right lung had expanded fully

In case 3 the patient had been wounded ; days previously He had hemoptysis and had been great sulfonsmides by mouth. He had a throughted through bullet wound of the chest. There was a large right hemothorax which was aspirated. Thecaltures were sterile. He was evacuated 16 days lowing injury and o days after admission to the hospitel

These cases were treated conservatively When intrathoracle hemorrhage occurred the patients were not operated on for at least a week. The patients were not moved during the first 48 hours, being left in bed in the clothes in which they arrived. They were given sufficient morphine to make them epthetic during this period. Fluids were given liberals by mouth Penkeillin was given Intrammenlarly so ooo units every three hours. When operation of a hemothorax was carried out, 40 000 units of penicha in so c.c. of saline solution were injected into the pleural cavity Only small amounts of intravenous therapy were given.

RICHARD J BESTRETT, J M.D.

Humphreys, G. H., and Southworth, H.: Aphale Anemia Terminated by Removal of a Mednational Tumor Am J M Se, 1945 1 0 pm

With the exception of tumors of aberrant panthyroid tissue and those arising from the thymse there are no known mediastinal tumors hick in general effects. Only a few tumors apparently as sociated with anemia, because they influence either the formation or the destruction of blood, last been reported.

The 58 year old patient in the case reported by the authors had a mediestinal tumor which had been present for a number of years it had resisted rade therapy but showed no signs of malignancy Dur ing a considerable period of observation the patient nifiered from a profound depression of erythrocyte formation, although leucocytes of bone marrow on gn were never deficient in number. The red cells present were not abnormal in size or shape, and there was no evidence at any time of chronic blood loss or abnormal erythrocyte destruction During this pen od of anemia, reticulocytes were never found on any attempt except twice when isolated ones were seen within 48 hours of large transfusions. All of the usual therapeutic measures to stimulate red cell lormation were without effect. The patient was maintained with transfusions of whole blood and saline suspensions of erythrocytes for 22 months The mediatinal tumor was removed without diffi culty and the patient made an uncomplicated re-

Following removal of the tumor a sharp reticulocytosh occurred with a resultant restoration of the erythrocyte count to normal, where it remained for a year after operation During this period the pa tient acted on one occasion as a donor for a transfunou, following which her reticulocytes responded normally and her blood count was not conspicuously affected Ten months after operation she developed an abscess in the thigh which required drainage and an autocoo in the ringu winch required the makes and healed slowly. A year after operation before the astocas had bealed completely the patient rather suddenly developed acute ascites and jaundice went to be a suddenly developed acute ascites and jaundice went to be a suddenly developed acute ascites and jaundice went to be a suddenly developed acute ascites and jaundice went to be a suddenly developed acute ascites and jaundice went to be a suddenly developed acute as the into come and died Autopsy showed widespread bemochromatosis and no evidence of reappearance of the original tumor The nature of this tumor remains in doubt, although a thymic origin was sug gested

# MISCELLANEOUS

amson, P. C., Burbank, B., Brewer, L. A. III and Burford, T. II. i Immediate Care of the Wound ed Thorax J Am. M Ass 1945 129 606.

A rational plan has been adopted for the early preoperative care of the severe thoracic casualty which program is applicable to the thoracic injuries and wounds which may be encountered in civil and

Adequate resuscitation is a necessary preparation for surgery or for transportation Unless hemorrhage industrial practice. or the urgency of other wounds dictates early surgi cal intervention the majority of serious thoracie casualties will be greatly benefited if they are not mished to the operating tables, because patients with extensive contusions of the lungs or heart are poor raks and surgery in these patients should be de

The methods of resuscitation are (1) restoration layed whenever possible. of normal thoracic physiological conditions including the control of pain and the treatment of hemothoray anoxia, and pressure pneumothorax (2) fluid re placement and (3) the early prevention of infection Oxygen should be freely used before syanosis develops in any patient who is restless or dyspneic

or whose pulse remains elevated (aution should be observed in the administration of morphine proving thoracic dyafunction consists of nerve block for the control of pain, thoracentesis and water trap catheter drainage for intrapleural pathological changes, and mechanical suction (eatheter aspira tion bronchoscopy) for the removal of excessive bronchial fluids.

# Berk, M : Cardioesophageal Relaxation Gariro-

Cardioesophageal relaxation or incompeniency of the cardiac sphincter is an abnormality in which contents from the stomach regurgitate freely and passively into the esophagus and may be looked upon as a direct antithesis of achalasia (cardiospasm) Although it can be recognized by means of x rays, and though in itself is apparently not a clinical entity, it nevertheless assumes importance in its differentiation from other conditions occurring in the terminal esophagus. It frequently gives rise to symptomatology distressing enough to require

In patients observed by Robins and Jankelson the lower I to 3 inches of the esophagus was found to be medical attention. dilated These authors classified the dilatation into two types tubular and globular according to the degree of reflux, its duration and possibly on the gastric tone or intragastric pressure. They divided their cases into three groups according to the im portance of the condition (1) those with demonstra ble gross pathological changes within the gastroin testinal tract, (2) those with pathological changes outside of the gastrointeaunal tract, and (3) those with only functional disturbances. The third group was termed pure cases of cardiocsophageal relaxa tion. All of the patients were considered unstable being classed as psychoneurouc. In general this group was characterized by hypochlorhydra, and the x rays revealed hypertonicity of the stomach with moderate pylorospasm To reverse peristalsis

Two theories as to the explanation of the phe nomenon of cardiocsophageal relaxation may ex plain the reflux of barrum into the esophagus First there is an increase in intrapastric pressure due to hypertonicity or hyperperistains with equal pressure on both openings. The weaker or cardiac sphincter will give way with reflux of the gastric contents into the esophagus. When the tension is relieved the liquid reflux will return to the stomach sided by esophageal peristalsis and its own weight. The sec ond theory has to do with a disturbance in balance

The author reports the case of a 47 year old male of the autonomic nervous system who gave a history of stomach trouble since 1917 and complained of epigastric dutress. The patients complaints consisted of intermittent episodes of full companies consisted in meaninteen epissues of the test state meals, belching pyrosis, nauser regurginess after meals, belching pyrosis, nauser regurginess and rare voniting. He complained of no true abdominal pain Relief from his symptoms would be a supplied to the belching test of the particular come principally from belching regurgitation of small amounts of liquid food, and the use of alka seltzer Most important of all, he found that when he took the upright position and walked around he would nearly always obtain relef. In addition he began to note during the past few years that when he ate solid foods he would frequently have the sen sation that they had been obstructed at the region of the lower sternum.

Cholecystograms gastromtestinal series and fluor oscopic observations revealed no gross pathology to be present. Films taken in the recumbent position presented a globular mass of barium just above the cardia in the region of the lower esophagus. In the supine and Trendelenburg positions a portion of the barium was seen to roll back into the esophagus and extend as high as the upper third of the latter In addition, baruum was observed to pass to and fro within the esophagus, according to the phase of respiration. When the patient was placed upright the meal was seen to flow back into the stomach.

An esophagoscopic examination revealed that the esophagus was dilated and flabby. Without meeting the least resistance the instrument could be propelled forward into the stomach. There was no true histus hernia.

A diagnosis of cardocosphageal relaxation was made. An attempt was therefore carried out to stimulate the smooth muscle tone by the use of physostigmine and prostigmine given both orally and parenterally, without any apparent benefit. Ad ditional drugs which proved ineffective, were dilute hydrochloric antacids and belladonns. The regimen which seemed most beneficial was to have the patient eat a light meal several hours before bedtime and remain erect during that time.

The importance of cardioesophageal relaxation is its possible confusion with other more significant leations occurring about the terminal esophagus. In fluoroscopic examination, particularly in the erect position, the csophagus appears normal in all respects, except possibly for the normal lack of delay at the epicardis. If fluoroscopic examination is negative in the erect position and a globular or tubular shadow of barium is seen just above the stomach on the immediate films in the supuse portion, cardioesophageal relaxation should be suspected

LLE PULLEY M.D.

Paine, J. R., and Piankera, A. G. A Roriew of Patients with Intrathoracic Disease and Injury Treated on the Surgical Service of a United States Army General Hospital in North Africa. Surgery 1945, 18 401.

Of 81 patients admitted to the Chest Division of the Surgical Service of a United States Army General Hospital during the period of its operation in North Africa during the spring, summer, and fall of 1043 66 were battle casualties. The hospital installations were in Nissen buts and tents. Until the end of the Tunisian Campaign this hospital was the most forward of any of the American general hospitals in North Africa. Even at the busist periods however the hospital was not called spea to reprimary surgical treatment to any battle erecexcept in a few isolated instances

The report concerns only those patients with r trathoracic disease or injuries involving the thraccavity and there was only 1 death during operator. that of a patient with mediastinal teratorn, Ttreatment of patients with intrapleural access tions of blood or bloody fluid was accomplished by repeated thoracentesis Seventeen patients ladies subjected to primary major surgical procedure more forward hospitals only t however, and treated at this hospital. Twenty-or patient is metallic foreign bodies retained within the chet k. none was operated upon at the hospital, T est is per cent of all patients with intrathorace some r injuries were returned to duty after their stn z the hospital, and one patient with as organic intrapleural hematoma was successfully occurupon with gratifying immediate results.

STEPHEN A. ZIENAN, M.D.

Harrington, S. W. The Surgical Treatment of the More Common Type of Disphragmatic Boss Ann. Surg. 945 22 546

In the author's experience with 441 core diaphragmatic hemia the most common by which require surgical treatment, in order directly of the most common than the most common and the most core trauma, indirect or direct, or to indiamentary recroils absence of a portion of the diaphragmatic pleuroperitonesalis hemis and herois through the foramen of Morgagni.

Each of these various types of daphanets hernia presents different clinical manifestitioned requires different methods of surpical treture. Some of the more important clinical and surpaspects of these different types are considered not

original article. The clinical syndrome of disphragmetic lenmay be divided into two main types. The fix occurs in cases in which the stomach is the acabdominal organ involved in the hernia. The star toms are those of intermittent and usually practisive incarceration and obstruction of the stead The most common type of disphragmatic bens ! which the stomach is the only abdominal viscos of volved is through the esophageal blatus. However, this type of hernia may contain various porters of the omentum, according to the amount of stored involved in the hernia. Insamuch as this tyre progressive the entire stomach may become brok in the hernia, and the colon may also beceme corporated in the hernlal sac because of its studment to the greater curvature of the stomach rarely the spleen may become involved because di attachment to the cardin of the stomach. In cases in which the colon is involved, there may be additional symptoms of partial or complete interest obstruction

obstruction

The second type is found in the case in slidmult ple abdominal viscera are involved in the ernia. The bernia is usually of traumatic origin and s caused by laceration of a normal diaphragm. However it also may be of congenital origin and may result from congenital structural deficiency of may result from Onigential acquering democracy of the disphragm. The symptoms are more varied and severe than those in the first type because of the multiple structures involved and they are often more acute in onset The initial symptoms may be those of acute intestinal or gastric obstruction or

In the treatment of all hermas that have occurred through the left portion of the diaphragm, the author prefers the abdominal approach by means of author process are accommon approach by means of an oblique left rectus incision starting at the ensiform cartilage and extending to the outer border of the rectus muscle. He believes there is less risk of though muous are beneves there is less risk of It is of particular advantage in cases of esophageal hernia for the herniated stomach is usually confined in a sac in the posterior part of the mediastinum

nd does not enter the true pleural cavity In the repair of hemias through the right portion of the duphragm the author prefers the thoracic approach because the large, right lobe of the liver makes the abnormal opening in the diaphragm inac cessible from the abdominal approach.

The technical difficulties of adequate exposure of the hemial openings through the left portion of the

diaphragm and the esophageal hiatus are often con siderable because of fixation of the left lobe of the liver to the leaf of the diaphragm The exposure is greatly facilitated by cutting the suspensory liga ment and retracting the left lobe of the liver to the right. This can be accomplished when the left lobe is small, by folding it on itself, and when it is large by retracting it forward into the wound The spleen is often very adherent to the posterior part of the disphragm and hernial openings, but usually can be separated from these structures by blunt dissection In some instances the spleen has been so traumatized by the injury and so bound into its abnormal posi tion by adhesions that it cannot be separated from the hernial opening without seriously injuring it This not uncommonly occurs in the traumatic types of hemia and occasionally in esophageal histus bernia. In cases of this type splenectomy is nec

Paralysis of the disphragm produced by temporary or permanent interruption of the phrenic nerve, essary is of value as a procedure preliminary to radical operative repair of esophageal hiatus hernias It is a necessary procedure in the surgical treatment of partial thoracic stomach resulting from a congent tally short esophagus In some cases in which radical operative repair is contraindicated it may be used as a palluative measure

## SURGERY OF THE ABDOMEN

## ABDOMINAL WALL AND PERITONEUM

Gatch W D., and Montgomery W F : External Hernias Containing Gangrenous Bowel J Am M Ass 945 199 736.

A review of the reports on strangulated hernia published since rors shows that the results of treat ing this condition are as poor now as they were then in fact the death rate is about as high today as it was in the days of preasentle surgery. The plan of treatment described by the authors briefly consists of three parts

I Incision of the hermal sac together with the gangrenous bowel within it.

2 Deflation of the obstructed bowel with a Miller Abbott tube down to the point where it is obstructed at the hernial ring. This restores it to a healthy condition and permits giving the patient liquids and soft foods by mouth, which corrects starvation and dehydration.

3 Laparotomy done after the tube has been down for about a week (through a low paramedian incision) excision of the gangrenous bowel, and in testinal anastomosas plugging of the femoral ring with omentum statched to it and treatment of the abdominal wound with sulfathlazole after closure of

the peritoneum.

Three case histories are given. EMIL C. ROBITHERE, M.D.

Aird I: Acute Nonspecific Mesenteric Lympha denitis. Brit M J 945 2 680

Although often described in British, American and other medical literature the author believes that acute nonspecific mesenteric lymphadenitis has found no general acceptance as one of the commonest causes of acute abdominal pain in children and as an occasional puzzling affection of adults, As a rule the term is omitted from the index and text not only of surgical manuals but even of encyclopedic reference works, and there are hospitals in which all inflammatory enlargements of abdominal lymphatic glands are presumed to be tuberculous. If the condition is mistaken for acute appendicitis as it frequently is no great harm is done it may be wise to sacrifice accuracy for safety Material injustice may be caused however if the disease is wrongly labelled tuberculosis." the patient's medical record is distorted relatives are subjected to unnecessary anxiety and the premium for a life insurance policy may be raised.

As to the pathological features, the mesenteric glands-juxtaintestinal along the mesenteric attach ment of the lowest few feet of Heum, intermediate along the ileal arteries and terminal on the main superior mesenteric trunk-are discretely enlarged The first or the last of these groups may be involved alone or all three groups may suffer together. The

anterior and posterior cecal and fleocolic glassica or may not be simultaneously affected. The art intestinal glands are predominantly invents early stages of the disease early in an attack for may be pink in color but usually they are local. be white. The intermediate and terminal shows predominantly affected in later stages of the fruit they seem always to be white in color The minglands are soft and julcy at first, clastic kin, in finally quite hard, it is uncertain whether order tion ever occurs in nontuberculous adeath Is leaves of the mesentery, and if the terms leave mesenteric glands are involved the adactive toneum of the posterior abdominal vall, as k congested The perstoneum of the asterior size. nal wall is nearly always unaltered. The lens, = sometimes the cecum and appendix as vel, as show serious hyperemia, and sometimes a princiedema of the whole thickness of the bord of This inflammatory appearance of the interior commonly found only during earlier attacks of its disease it may affect a considerable length of len fleum, or several discrete stretches of bord, a exone short segment or it may be restricted much palpable thickening of Peyer's patches. Frequent, with or without an inflammatory appearance of the bowel there is a small quantity of clear feel in within the peritoneal cavity

The history is not particularly characters to It patients more often male than female, are were children beyond the years of infancy but the on dition has been recorded at 10 months and a ? years of age. The pain is essentially a general dominal colic, often of extreme severity and intense and alarming than the initial colic of speed citis in childhood Between spasms of cole tiers entire freedom from pain. Even during the and attack of pain the patient moves freely about violently sometimes, with a constant character position which would be unusual in sente speed citis. As in appendicitis, when the patient shale given a history of generalized abdominal pass asked to indicate the site of most intense per k points to the right lower quadrant. In control b the patient with acute obstructive appendicts, in ever, he cannot locate the rite of mauman precisely but indicates an fil-defined area of the right side Nausca usually with vomitor, and panies one at least, of the initial attacks. Daniel is exceptional. There has been quite often a rem sore throat or other upper respiratory infection

Cinical examination provides no more area evidence than does the history The patent gr seem little affected except by pain, or may be made and obviously feverish or pale be a selden or me prostrated or ominously motioniess. If takes only in an attack, the temperature is elevated to 10 even substantially higher and on the first day are here is an almost invariable leucocytosis of from 5,000 to 20,000 with 80 per cent or more of granu 5,000 to 20,000 with 60 per cent of more or grand ar cells. As a rule the white count falls again on the cond day-its elevation is quicker higher and orter-lived than in acute appendicitis. A bright id pharyngits is not an unusual concomitant of onspecific mesenteric adentits but neither its onspecine mesencial administration of the second of the se bdominal examination tenderness is elicited in he right line foss, higher and more medial than the ne ngm mac toos of acute appendicitis. The lowest init of tenderness is just below and to the right of the umbilicus. When the terminal (superior mesen neric) glands are widely involved a band of tender aces may be outlined as it extends upwards and to the left towards, and sometimes just beyond the

idline of the epigastrium. The right lower abdomi al muscles are nearly always in slightly higher tone han their fellows of the opposite side but rigidity is not maximal or if it is the muscles soften per eptibly under continued gentle pressure Rebound tenderness is not unusual, particularly if the leaves of the mesentery or the serous of the bowel are in flamed. One sign, shifting tenderness, is said to be pathognomonic certainly its presence is most sug gestive though its absence is not significant elicit shifting tenderness the site of maximum tender

as is located while the patient lies supine the potion is then changed to the left lateral, and after a with a men changed to the left section, and are we minutes, if the sign is present the point of maximum tenderness will be found to have moved left ward to or beyond the midline The sign depends upon postural displacement of the lower fleum with its mesentery, and is elected only if the juxtaepi physical giands are inflamed. Rarely it may be positive early in acute appendicute if the eccum is highly mobile The enlarged glands are seldom pal pable, even those at the root of the mesentery fixed against the background of the posterior abdominal rall and free fluid is not often of sufficient amount

Confusion with appendicates is less likely to occur to be detected by percussion in practice than seems possible when the symptoms and signs of the two conditions are compared on paper The sharp spasms of colic with complete or almost complete freedom from pain between them the rolling and kicking of the child in an attack the high and medial situation of the tenderness, the absence (if it is absent) of the rebound tenderness even at the point of maximum tenderness the presence (if it is present) of shifting tendemess, the relaxation under steady pressure of apparently rigid muscles and the history of previous typical recur rent attacks if these have occurred, all inspire confidence in a negative diagnosmof this is not appendi dis" even if they fall to suggest the positive diag nous of nonspecific mesenteric adentis.

Differentiation of nonspecine from tuberculous mesenteric adentis is not always easy. In the latter condition leucocytosis is usually absent throughout the abdominal wall is almost completely lax, en larged matted glands are usually palpable and pain

or at least discomfort is more constant between attacks. If operation is not performed and doubt exists, it is not only more accurate but it serves better the interest of patient and of community to regard the condition as nonspecific unless there is dear evidence of tuberculosis elsewhere—in neck or

Other forms of mesentene gland enlargement chest, for example seldom produce acute abdominal symptoms. At operation malignant glands can usually be recog nized by their character. In lymphadenoma and

infectious mononucleosis glands elsewhere in the body are simultaneously enlarged Even so it is wise in nonspecific admitts to carry out a differential white count and the Paul Bunnell test

The appearance in the glands, and more especially the appearances (when they are present) in the wall of the intestine are those of acute inflammation and strongly auggest a response to infection The appendicular origin of nonspecific adenitis however, is difficult to substantiate when it is remembered that the juxtaileal glands predominantly and in variably enlarged in the early case of adenlits are not found enlarged at operations for overt appen

Nonspecific adenitis has been ascribed to the passage of a hypothetical virus through the mucosa of dicular infections the intestine to its submucous lymphatic tissue, and thence to the mesenteric glands Some support is lent to this hypothesis by the failure to culture bac teria from glands which are apparently the seat of acute inflammation The coincidence or precedence of upper respiratory tract infection is an additional argument in favor of a more or less generalized virus A relationship might be suggested between mesentene lymphadenitis and the scute regional ileitis of Crohn. The gland enlargement in the mesentery of the affected bowel in regional ileits is identical with that seen in nonspecific mesenteric adentis indeed it is a nonspecific meenteric adentis conversely an early nonspecific adentis accompanied by a patchy pink inflammation of the serous coat of Heum and more significantly still, by an edema of all coats sharply demarcated from healthy bowel suggests an early, mild, self limiting regional ilelia it is a regional ilelia in the widest sense of the term The identity or diversity of the two conditions could be proved only by the demon stration of the ultimate cause of one of them or the

In the author's experience appendectomy does not affect the course of the disease which in any case causes of both is self limiting and from which ultimate recovery seems to be invariable.

# GASTROINTESTINAL TRACT

Hardt, L. L., Hufford A. R., and Rabens J I. An Analytical Surrey of 1132 Patients Gastro-Scopically Examined, Gestroenisrology 1945 4 477

One or more gastroscopic and roentgenological examinations were performed on 1 132 Patients who eosin. One block was me is through the anast motic junction extending through the ulcer and the other section from the anastomotic ring free of gross ulceration.

In this study the gastrojejunal ulcer was found to be a disease of middle age 93 per cent of the patients were men and 7 per cent were women. Pain was the most common symptom of gastrojejunal ulcer in this series of patients, being present in 85 per cent of the patients. The location of the pain varied markedly in some patients the pain was epigastric or the same as that produced by the original duodenal ulcer in others the pain extended downward to either side of the umbilicus or upward to the shoulder blades at times the pain extended downward as far as the

groin.

Hemorrhage was the most common symptom.

Hematemesis and melena occurred in 32 per cent of
the patients and melena alone in 42 per cent. The
hemorrhages varied from massive angle hemorrhages
to repeated small hemorrhages. Vomiting occurred

in 24 per cent of the cases.

Histological examination in this series showed that 87 per cent of the ulcers were on the fejunal side of the anastomosis, 3 per cent on the gratric side, and 3 per cent on the anastomotic line. The site of the

remaining 13 per cent could not be determined. In general, the ulcers resembled the peptic ulcers customarily seen. They were typically rounded and stamped ut the mucosa and submucosa were absent over the base of the ulcer, and the muscular layers were completely replaced by fibrous tissue. Scrosz was absent in all instances. It was concluded, however that the absence of scross was secondary in importance to the method of preparation of the alide The anastomotic junction showed that the mucosa was well united in most instances but varied somewhat from the normal. Usually the gastric and fejunal mucosa ended abruptly but there were instances in which the jejunal glands were seen o the gastric side of the anastomosis. In a similar fashion gastric glands with acid cells were seen as frequently on the jejunal side of the anastomosis.

In the majority of cases a moderate degree of both gastrilis and jejunitis was noticed An attempt was made to correlate the severity of the clinical symptoms with the pathological changes, but relationably was evident. In some cases of severe gastrocipluitis only mild symptoms occurred whereas, on the other hand, in some cases of mild gastrojejunitisthe clinical symptoms were severe.

SAMUEL J FOOTLISON M.D.

Ransom, H. K. Gastrojejunocolic Fietula. Sur gery 945 18 177

During the 10 year period from 1934 to 1944 47 patients were treated by surgical operation for mar giand or jejunal user at the University of Michigan Hospital, Ann Arbor Five of these 47 patients required an additional operation during the same period because of recurrent gastrojejunal ukcration and 1 patient was operated upon three times for

tl is same a ndition. Thus, a total of 54 operations was performed upon 47 patients. Of the afore mentioned 47 patients, 8 (17%) had the senous complication of gastrojenucoolic fatula. It is with this latter group of cases that the present discussion is concerned.

A survey was made of all of the cases of gastolejanocolic fistula at the University Hospital since its opening in 1925 and it was found that during 1925 to 1944, 18 unmistakable cases of gastrolejunocolic fistula due to ulcer had been encountered.

Gastrojejunocolic fistula almost invariably ocran as a complication of a marginal or jejunal ulcer at the site of a gustroenteric anastomosis for duodenal ulcer The great majority of cases occur in mstances of posterior gastrojejunostomy and much more often following simple short circuit operations rather than in cases of gastrole unostomy associated with partial gastric resection. In every one of the cases under discussion, duodenal ulcer was the primary lesion. It is a well accepted fact that marginal ulcer rarely occurs following gastroenterostomy for gastric ulcer and is almost unbeard of following gastroenterostomy for carcinoma of the stomach It is often stated that gastrojejunocolic fistula and gastrojejunal ulcer very rarely occur in women, the reason for this being the lower values for gastre acidity in women as compared with men. Walle the exact cause of marginal or jejunal ulcer is not known, the prevailing view is that these lessons most often occur in patients whose gastric acidity remains high following operation. This is much more apt to be true in gastroenterostomy or duodenal exclusion operations as contrasted with subtotal gastrectomy In all of the authors cases, save 1 posterior gastroenterostomy was the primary operation which as

followed later by a marginal ulcer.

It would be expected that prior to the onset of the fistula, symptoms of an anastomotic alcer would usually be present. This, however was not true in the majority of the cases herein reported as only for emailing 1 a patients in this sense apparently were relatively symptom free until the onset of the symptoms of instula. In view of the mechanical nature of the lesion any great improvement in the state of nutrition prior to operation is difficult 1 impossible. Properative laboratory work should include the determination of serum proteins and prothrosian cotting time.

The surgical operation in all cases consisted of a one stage procedure. In 10 instances a restorative type of operation was performed wreets in 4 case, gastric resection was included. There was 1 port operative death in each group, ra mortality of 113 per cent for the entire series.

Follow up studies showed that all patients who survived operations including gastne resection had good results, whereas only 4 of the 9 patients or viving the more conservative operative procedure remained free of ulcer symptoms. Three of the 5 patients with recurrent ulcer subsequently required patients with recurrent ulcer subsequently required.

further surgical theral 3  $N_C$  leaths occurred any  $n_C$ these patients who later required reoperation

While gastric resection is ordinarily desirable at the time of the operation for the repair of the instillars, it is not always feasible or safe Restoration of the tract to normal, therefore is a useful procedure in certain cases This was true particularly in these cases because many of the original gastroenterostomics were performed upon meager indications as judged by present day standards. If further surgery junged by present the ulcer becomes necessary later for recurrence of the ulcer becomes necessary later subtotal gastrectomy can be carried out upon a patient in good condition with a very low mortality

Gastrocolic fistulas due to primary disease of the stomach or colon are discussed The petients present problems in preoperative care and in certain matters of surgical technique which are similar to

A small group of gastroenteric fistulas due to sur those just discussed goal errors at the time of the original operation for ulcer is considered briefly

# Berkman J M., and Heck, F J : Symptoms fol lowing Partial Gastric Resection Gentrocaler

The authors present a resume of their observations of the unfavorable symptoms exclusive of recurrent ulceration which may follow partial gastric resec tion The cause of these symptoms has not as yet been explained satisfactorily At the present time however the most commonly accepted explanation of the postprandial symptoms known as the dump-

ing syndrome, is jejunal distention The manition which may occur as a result of the postprandial symptoms may be overcome by placing the patient on a high protein diet, first with a small amount of bulk and then a gradual increase of the bulk to that amount represented by 2 500 calories. By this method without further increase of bulk, a diet with a calone value of 3 200 calories may be reached which will insure a progressive increase in weight without an increase of the seventy of the

A group of patients who have experienced nauses postprandial symptoms. to a sufficient degree to prevent the cating of several nonconsecutive meals each week has been observed The nausea was not associated with postprandial symptoms and did not follow the taking of food

Also a number of patients have been seen who although they had experienced no symptoms after partial gastric resection had found it impossible to eat enough in the usual three daily meals to regain the weight lost after operation. By the dectary method described a progressive gain in weight was brught about without postprandial discomfort.

In some cases hypochromic microcytic anemia developed after partial gastric resection and failed to respond to the usual treatment for hypochromic anemia. The value for hemoglobin improved after a high protein diet with a caloric value of \$ 200 calories

ha I produced an increase in weight CHARLES B ROY M D

Learner N Robinson II W. Grishelmer L M. and Oppenheimer, M. J.: Effects upon the Small Intestine of Rapid Intravenous Injec. commit sincularity of responsion for Carrocalerology

The possibility that amino acids when used intra venously may alter intestinal motility and hence endanger new suture lines prompted the authors emanger new auture miss prompted the auture study. The reaction of the mixture of acids used is in the region of pH 5 and may produce a temporary lowering of the blood pH when introduced into the blood stream in sufficient quantities at a rapid rate The role of change in pH on motility is also in need of investigation and the authors study includes of investigation and the duodenum was selected such considerations. because of the frequency of surgical intervention in this area Studies were carried out on patients with normal geatrointestinal tracts and on dogs with and

The authors discuss the methods used and the results obtained in (1) anesthetized dogs (2) patients without anesthesia with normal gastrointestinal tracts and (3) dogs

In conclusion the authors state that rapid intra recently operated upon venous injections of casein hydrolysate produce a duodenal hypermotility or change in pattern of motility in anesthetized dogs. This hypermotility is not accompanied by significant changes in pil carbon diaxide chlorine or total base concentration of the blood plasma The blood glucose concen Neither hypermotility nor of the blood plasma hypersycemia is prevented by atropine of vagot one. New intestinal suture lines are not disturbed tration is elevated by the hypermotility during parenteral use of casein digest Rapid intravenous injections of casein digest in unanesthetized humans change the character of contractions and often accentuate tonus changes. Subjective sensations and changes in motility were correlated in only half of the cases studied EMIL C. ROBITSHEE M D

# Falk, H. C., and Hochman S.: Intestinal Injury and Fecal Fistula in Gynecological Surgery

The small or large intestine may be injured dur ing any gynecological laparotomy most often on the separation of adhesions found between the intestines, the pelvic viscers and the abdominal wall These adhesions may be the result of pelvic inflammatory disease or of previous operations. This is shown by the high incidence of fecal fiatules following surgery

There were 42 cases of intestinal injury observed for pelvic inflammatory disease. by the Gynecological Service of the Hartem Hos pital from 1918 to 1943 where more than 80 per cent of the patients operated upon have some de gree of pelvic inflammatory disease. During this period of 10 years 5 055 laparotomics were per formed. The known incidence of intestinal injury

The intestines may be injured on opening the was therefore o 83 per cent peritoneal cavity This type of injury as a rule t

detected and repaired immediately. Such accidents are more common in patients who have had a previous laparotomy. In this series there was only it such case. No fatula followed. The bowle may also be lacerated in cutting across the vagina in a total hysterectomy if the rectum is adherent to the posterior wall of the cervix. There was no such accident in this series alongly to the intestines may also occur in the separation of adhesions between two loops of bowel the intestines and pelvic organs, or between the intestines and the abdominal wall.

Two types of adhesions are found, those caused by a previous langratumy in which the intestines and omentum may be firmly matted together with the pelvic organs and those caused by pelvic inflammatory disease, conorrhea produces few adhe sions except at the imbriated end of the tube. The adhesions between the intestines and the tubal wall are usually friable thin and flimsy and easily separated. When the ous has spilled into the cul-de sac, the adhesions between the sigmoid tube, and posterior wall of the broad ligament are very dense. Here the separation is usually done blindly (without vision) and the large bowel may early be injured such an injury may not be recognized. There were 7 such cases of injury in which the algracid was densely adherent to a tubo-ovarian abscess or pyotalpinz.

Usually the intestinal injury is seen and recognized at the time of operation. There were, however many cases in which the intestinal transma ultimately caused necrosis of the bowel, but no injury had been recognized at the time of operation. As a result, a fecal furtual or fatal peritorities courted next

operatively

In pelvic inflammatory disease of progenic or tuberculous origin, degenerated or infected fibroids, endometriosis, ovarian and tubo-ovarian abscesses and malignancies the adhesions encountered are very dense. In the separation of these adhesions to isolate the pelvic structures, the intestines are easily injured

The most reliable index of acuteness of pelvic inflammatory disease is the sedimentation rate

Among the 18 cases of fecal fistula, there were only
4 in which the sedimentation rate was longer than
30 minutes.

30 minutes.

The 42 cases of intestinal injury were divided as

follows
1 Injury detected and repaired during operation without fecal fistula formation—22 cases.

- 2 Injury detected and repaired at operation, with the development of fecal fittula -3 cases.
- 3 Injury not detected at operation, with result ing fecal fistula-15 cases.
- 4. Injury not detected at operation, with result ing peritonitis and death-s cases.
- x and x Injury detected and repaired during operation—25 cases. In 25 or 50.5 per cent, of the total number of 42 cases, injury to the intestines was detected and repair was accomplished during operation.

The prognosis in intestinal injury is largely dependent upon recognition and repair at time of operation

Repair of intestinal injuries was accomplained by two to three rows of locked interrupted, or continuous running sutures of No co chromic cates of Pagenstecher thread.

In recent years 10 gm. of a sulforaunde were placed into the pelvis and over the repaired are.

The treatment of feed fastules low in the interinal ract, as in the terminal fleum, signoid, or remain a much less urgent than that of those located in the duodenum or upper jejunum because of the significant fleum and the significant fleum smally hell spots and for the significant time should be allowed for the factorial state of the significant time should be allowed for the fattulas to chose spontaneously before surgery is attempted. Honey W Fras, Lib.

Pugh, H. L.: Regional Enteritie. Aux. Sury 1915, 127-825

Crohn, Ginzburg, and Oppenheimer in 1813 published the original article describing the climal entity known as regional enteritis. This article was so accurate that all the literature contributing to the subject in the past 13 years has subtracted nothing from it. The original title was Terminal Beks' The author has substituted the word regional since "terminal suggested agonal and enterits les been substituted for "lieitis" since not infrequent other parts of the small or large bowel have been affected. Numerous names have been suggested for this condition, among which have been termina ileitis regional ileitis, regional ileocolitis, regunti enterocolitis, segmental enteritis, nonspecific grass loma, infective granuloma, chronic cicatrising or teritis pseudocancer Crohn a disease, and reposit enteritis. The last mentioned term is the most pops-

lar and comes nearest to being true and appropriate.

The authors present a series of 17 cases, and confirm some of the special observations which have

been made by a variety of contributors.

It is believed that this disease has existed as centuries. W J Mayo in 1893 Combe in 191, and Moschowitz in 1933 described case in the iterature which probably were regional enterlits. Ther appears to be a definite locrease in the incidence of the disease which cannot be entirely explained by

the improvement in dagnosis.
The ctiology of this condition is still unknown.
The theory that Koch s bacillus may be the caretive agent has been disproved. It is not improbable
that there may be some correlation with measures
lymphademitis. An allergic tieup is still fascidSeveral writers have reported that the mainly issue.

a predilection for Jews, particularly at an early at.

It has been claimed that the discret is more perlent in Eastern cities, and it is probable that ther
may be a seasonal variation in the endeaty is
acute exacerbation of the discrete. Croin suggest
the disease may have a familial tendency. It
discuss is more likely to appear between the area

15 and 40 and the majority of statistical reports indicate a slightly greater frequency in males than

Knowledge of the early stage of regional enterities remains conjectural, since it is seldom recognized females. until thoroughly advanced It probably begins as a proliferative process in the interstitial structure of the bowel wall and progresses to a cicatrising granu line nowed wan and programmes becomes ulcerated as long tous lexion. The mucosa becomes ulcerated as the bowel thickens possibly from interference with the blood supply, or from an infective process (virus or bacterial). Fibrosis develops and the bowel wall thickens. This, plus the contraction of cicatrising alcerated areas, narrows the lumen until obstruction may eventuate. The adjacent mesentery becomes

thickened and the mesenteric lymph nodes become enlarged and discrete Both the bowel and the mesentery become edematous With progress of the son the ulcrated areas may perforate and lead statement of the perforation of the second of the seco ommunicate with loops of small bowel, large bowel, hadder, or even through the abdominal wall. Some writers believe that the disease passes through four stages, namely (1) acute, (2) urritative (3) obstruct

Almost any part of the intestinal tract from the ive, and (4) fistulous. rejunum to the algmoud may be involved, with the terminal lleum the favorite site. The disease not m-Irequently extends past the ileocecal junction and invides the occum. Skip areas in several portions of the bowel in the same person may be involved

with healthy segments intervening The disease is chronic and is characterized by periods of exacerbation and remission. The weight of evidence and opinion indicates that spontaneous

The involved bowel during acute stages of the cure, if it ever occurs is rare. decase is swollen hyperenic, and inflamed The mesentery is awollen edematous, and likewise inflamed with lymph nodes varying in size from that of a pea to a walnut. Gross corrugations extend from the mesenteric border and tend to encircle the bowel and give it a cobblestone appearance It is not uncommon to see a considerable accumulation of serosanguineous fluid within the peritoneal cavity during the acute phase. The involved bowel by contrast during the quiescent or remission stage, remains heavy thickened and leathery devoid of its normal flexibility and distendability hyperema subsides the plastic exudate organizes

and forms dense fibrous bands and adhesions. Histologically the affected bowel reveals a marked firming and thickening of mucosal and submucosal layers. The entire structure of the bowel wall shows a mononuclear infiltration. Giant cells are not un common and frequently lead to a false diagnosis of

The symptoms depend on the stage, location and severity of the disease. The three cardinal symptoms tuberculosis. are intermittent cramplife abdominal pain inter mittent darrhes and loss of weight ausea is not uncommon and when present is usually accompa

nied by diarrhea. Anorexia is frequently seen the pain is usually in the lower right quadrant it is not surprising that 50 per cent of the cases have been diagnosed as acute appendicitis and operated on for that Hemorrhage from the bowel occasionally

Anemia is a common sign of regional enteritis and some temperature elevation particularly with acute exactivations is common. The temperature may be normal during remissions or may show a slight rise in the atternoon. The white blood count may be elevated to 20 000 in the acute phase or may fluctu ate between normal and that commonly associated with acute appendicus. The blood sedimentation rate is usually elevated. Not infrequently on abdominal examination a boggy mass may be palpated in the right lower quadrant. A mass with tender ness is sometimes palpated on rectal examination

X ray examination is frequently referred to as the most important diagnostic sign. Intestinal fistules or the narrowing of the luminal shadow in the terminal leum (Kantor's string sign) may be dem onstrated When present, this sign is practically

pathognomonic of regional enteritis. The author considers the points mentioned im portant in differentiating regional enteritis from acute appendicits, intestinal tuberculosis amebiasis

diverticultis, and chronic ulcerative collins In the author's series of cases the following com plications occurred in order of their frequency (1) an involvement of segments of the large bowel apparent ly as direct extension from involved small bowel seg ment (6 cases) (2) positive Kantor's sign (3) fistul ous communication within the abdomen-internal fistules (6 cases) (4) fistulous communication with the abdominal wall—external fistulae (4 cases) (5) obstruction (3 cases) (6) skipped areas in the small bowel (3 cases) (7) apparent subsidence of symptoms and absence of roentgenological signs without operative interference (3 cases) (8) hemorrhage (1 operative interference after operation (1 case) (10)

Of the 3 cases which cleared up without definitive fistulae or fissure in ano (1 case) surgery the first at operation showed six areas in the jejunum and jleum typical of regional enteritis with healthy bowel from 1 to 3 feet in length between the diseased argments. Because of the extent and dis tribution, the patient s abdomen was closed without resecting any bowel. Postoperatively penicillin was given with a rapid improvement in symptoms and a negative x ray of the bowel. The second case was diagnosed as regional enteritis after the Patient had been operated on for acute appendicitis by another surgeon. Six months later at cellotomy scarcely any evidence of the former scate process was found. The third case was a similar condition which im proved so much clinically that a second operation

Penicillin was used in 5 cases, all of which showed was not considered warranted prompt clinical improvement. While it may be speculative it is believed the drug was a definite factor in the amelioration of symptoms

The literature preponderantly favors surgery as the treatment of necessity Elliott Cutler of Har vard University still believes the disease should be treated medically unless certain complications arise. The author believes that surgical treatment is by all oilds preferable. All seem to agree that in the acute form of the disease no surgery should be instituted unless some complication such as obstruction makes emergency intervention imperative. It is inadvisable to remove a normal appendix in the presence of enteritis lest a fistula develop. If obstruction is present, most surgeons agree that a short-circuiting operation such as an ileotramsverse colostomy should be done. If the operation may be classed as elective the surgical proponents may be classed in two groups -those who advocate a a stage procedure and those

wh advocate a r stage procedure. The author resected the lesion and did an ilectransverse colostom, in r stage in all but r cases, in r of which a stage and in the other a 3 stage procedure was car ried out.

There was I death in the senes. A resection of the right colon was done with an end to-side illeotransverse coloatomy. The patient died a days later of urinary suppression, the cause of which was undetermined, but attributed to sulfa drug sensitivity At autopsy there was no blockage of the urinaferous tubules or peritonitis. Seniar R Broatom M.D.

#### Centeno, A. M: Diverticula of the Duodenum (Diverticulos del duodeno) Presus still argent. 945 32 1829.

The clinical and roentgen pictures of uleer of the duodenum are very well known but those of other diseases of the duodenum are not so well known. As a contribution to this subject the author discusses 55 cases of diverticulum of the duodenum seen at the National Dispensary for Diseases of the Intestinal Tract in Buenos Aires. Roentgenograms of a number of the cases are given

The first case of diverticulum of the duodenum was described by Chomel in 1710. The first stage in the hist y of the disease was devoted to autopsy descriptions, the second to reenigen examination and the third to clinical study. Case described the first roenigen examination of the condition in 19 and Fornell and Kay performed the first surgical operation for its treatment in 1913. Including the 52 cases discussed in this article the total number of

cases seen in Argentina has been 158

These diverticula are most frequent in the second portion of the dwodenum, then in the third portion and then in the fourth portion they are rare in the first portion. Those in the second portion are apt to press on Wirsing's duct and the common bile duct, and cause icterus and the symptoms of paracratitis. Those of other portions of the dwodenum often do not cause any symptoms at all and may be found only on autopay. Among the author's 55 cases 36 were in the second portion. In only 1 of the cases was the dwodenal diverticulum associated with diverticulus is of the colon. These diverticulus for the case was the dwodenal diverticulum associated with diverticulum associated with diverticulum.

generally solstary In only 2 of these cases was then a double diverticulum

These diverticuls may be congreital or acquired in the congruital cases all the layers of the Intesting wall are involved but in the acquired case the mucous and authorized here in the more than the middle period of tile and are about vote as frequent in males as in females. They are frequently complicated by other pathological conditions, and it has been claumed that any uncomplicated diverticals of the duodenum is symptomics. Of the authorized the duodenum is symptomics. Of the authorized the duodenum is symptomics. Of the authorized the duodenum is yet the creative resociated in other duesaes 7 with cystins, 9 with where of the duodenum is with camere. I the stomach, 2 is ulter of the stomach 1 with diverticulous of the colon, and 2 with displayment hermia.

The symptoms such as pain and vomities, are not pathognomonic and roentgen crammaton and quired for definite diagnosis. Icterus may be cased by infection but is not frequent as this part of the intention does not become infected earth.

intestine does not become infected easily. Uncomplicated cases should be given metal treatment designed to evacuate the diverticulant and prevent dilatation and infection. This may be accomplished by frequent change of positiva, the admanistration of antisparsoides and irrigates of the stomach. Small doses of sodium reliate or magnesium chloride attinuate the doctoral securitiva and aid in evacuation. Ten gram doses of bismuth carbonate, kaolin, or magnesium trifficiate may be given for inflammation. If surgery is we easily it consists of invagination or receition. If there is kiterius without calculus medical durings of the bille dots is preferable.

AUDRET G. MORGAT, M.D.

Hindmarah, T. A., Stewart, A. W. and Morrico, B.: Resection Operation for Gangreson Istussusception in Infants. Bril M. J. 1945, E. 48.

When in an Infant an acute intrastructories to comes irreducible and gangernous, not only is the choice of a sultable operation difficult but the result of the control of the control of the commonly does in these cases is either resection of the gangeron mass with end to-end or lateral anastomotics or teriorization of the mass with the formation of an enterostomy with a later attempt to close this file child survives. Suture of the proximal part of the intensaceptem has also been suggested the gangerous mass shorpling and periong per rectum. These operations are far from an action of the control of

In view of these results the authors have recently chosen to treat the irreducible gasteroom intrasterior by a mod feation of the Mikulier type of resection and are able to report 3 success. The danger of generalizing from 5 cases in recognish to the results in these 5 cases were so much better than those experienced with other methods that this report seems justified. At this point, however

it should be made clear that no major operation of this sort in an infant will be successful unless the child is given special preoperative and postoperative treatment by those who are experienced in modern pediatric methods and can Judge from hour to hour what measures are required to be taken A note by Brenda Morrison on these measures is included in

The Mikulica type of resection recommended is made possible in infants because at that age the this article croum ascending colon and transverse colon are very mobile. In both cases it was found easy after a small incusion of the peritoneum on the outer side of the intussusception to mobilize the mass and to bring it out of the abdomen with very slight traums. The next steps of the operation could then be performed expeditiously and with relative case

The operative procedure followed in both cases was aimilar. The preliminary attempt at ordinary methods of reduction having failed the intussusception was found to be gangrenous and some form of resection was therefore necessary The viable por tions of the Heum and colon were quickly joined together in the usual double barrelled Mikulica colostomy method, by two layers of continuous cat The satures, and the abdominal incision was closed around the bowel by interrupted sutures The con dition of both cases at the end of operation was satisfactory After 6 days the spurs were crushed and removed by the ordinary Mikulica method with the small crushing clamps. Six days later on the twelfth day after operation the stomata were closed after the bowel ends had been freed and turned in

The first patient has now made an excellent and permanent recovery The patient has gained satis actorily in weight, and a slight tendency to diar thes, due to loss of the ileoceral junction has cleared up. The second patient made an excellent recovery after operation, and it is anticipated that this patient also will return to normal health. JOHN E. KIRKPATRICK, M.D.

Newton F C. and Blodgett J B Succinylsulfa thereole and Intestinal Suction in Surgery of the Large Bowel Surgery 1945 18 200

There have been two recent important improvements in the operative preparation of patients for surgery of the large bowel. The first is the use of the Miles Abbott tube and the second is the use of chemotherapy to minumize the number and virulence of organisms within the lumen of the bowel article is a statistical report of the authors experi cocc at the Peter Bent Brigham Hospital Boston with these two adjuncts to colon surgery It compares the results in a series of consecutive cases of resection of the large bowel prepared by these two techniques with a series in which they were not used

Until recently proximal colostomy has been widely used in preparing patients for resection of the large bowel. The advantage of preliminary coloriony is that, preoperatively the bowel is relieved of distention and may regain its function and the

di tal lumen may be nearly emptied of its contents and postoperatively the site of anastomosis is kept at rest and the risk of blowout at the suture line from increased intraluminal pressure due to tem porary obstruction at the anstomosis is minimized A series of 114 cases of resection of the large bowel

was studied. The general preoperative and post operative care was the same in all except that in the test group (36 cases) succinylsulfathiazole was used before the operation and preoperative and post operative intestinal suction were carried out. In the control group (78 cases) primary colosiomy without continuity was the routine in resections with restoration of the continuity

The Mikulics type of resection was not required

The following data are of statistical significance in any cases of the test group

in the comparison of the two groups. The gross incidence of complications was re

2 The gross mortality was reduced from 19 to 3 duced from 58 to 25 per cent.

3 When similar operative procedures (resections and anastomoses) are compared it is found that the per cent incidence of postoperative infection is reduced from 43 to 6 per cent and the mortality is reduced from

The use of intestinal suction and succinylsulfa 22 to 3 per cent. thusole in the preoperative and postoperative care of patients who undergo resection of the large bowel or patients who undergo rescuent of the large power has a definite effect in reducing the incidence of postoperative infection and mortality JOSEPH GASTER, M D

# LIVER, GALL BLADDER, PANCREAS, AND SPLERN

Miristi P L.: Fourteen Years of Experience with operatoria catorce años de experiencia) Pressu suid

The first cholangiography practiced during opera tion was performed June 18 1931 on a patient with calculous hydropa of the gall bladder. The author reviews his experience with the method in the 14 years since that time illustrating his findings with case histories and cholangiograms

The method has demonstrated that there is peris tales of the common duct and that the hepatic duct contracts totally or partially both important factors in the filling and emptying of the gall bladder

in addition to contributing to our knowledge of the physiology of the bile tract, cholanguography is extremely useful in the diagnosis of many pathological conditions of this tract and has contributed greatly to better the surgical technique in opera tions on it. It gives the surgeon a so much clearer picture of the tract that he can avoid complications that were formerly frequent such as anatomofunc tional disturbances, residual lithiasis, cicatricial stricture of the hepatocommon duct and anom alies.

The important thing now is to help to generalise the use of the method rather than to discuss its value which has been proved beyond doubt.

AUDRET G MORGAN M D

Cole, W. H., Ireneus, C., Jr. and Reynolds, J. T.: The Use of Vitallium Tubes in Strictures and Absence of the Common Bile Duct. A. Surg. 1943, 132, 490.

The most serious stricture of the common bile duct and the one most difficult to correct is total "absence of the common duct which unfortunately is more common than the short stricture with sufficient proximal and distal ends for approximation. In 10 of this sense of 33 cases of stricture or absence (including a carcinomas of the common he patic duct) no duct could be found except the stamp at the hills of the liver. In this group he use of the vitalium tube was adopted and a few principles were established which helped the authors to arrive at a method of treating this defect which yielded faurly good results.

The method of repair of stricture depends upon the type of defect encountered. Defects can be divided tool four concountered. Defects can be divided tool four concountered (7) local that stodgood common duct, (a) stricture or absence of the terminal end of the common duct, (a) stricture or absence of the terminal end of the common hepatic duct, and (a) absence of the common and common hepatic ducts. In general, the utilization of rubber tubes in repair has not given astifactory results largely because they are unailly parsed within a short time. If they are returned there is a slightly greater tendency for the precipitation of bile saits in the lumen than in the lumen of vitallium tubes.

All (15) of the nubber tubes which the authors have inserted have been passed. Of the vitallium tubes which they have inserted 3 have been passed. Although the discussion in this presentation a related to the use of vitallium tubes in strictures or absence of the common dust, it is emphasized that whenever possible anastomosis should be made with no more than temporary intrataminals support. The bridging of defects by the insertion of a T tube serves the purpose of function quite well.

In stricture or absence of the terminal end of the common duct the authors are of the opinion that transplantation of the duct into the duodenum should be the first operation tried

The third type of defect is more difficult to repair than the first two largely because anatomosis of the duct at the bilus of the liver cannot be achieved with ideal technique. The insertion of a vitallism tube with the funnel end projecting into the stump of the common hepatic duct at the bilus and the lower end protruding into the common duct, as first performed by Clute is the procedure of choice.

When no remnants of the external duct can be found the problem of repair becomes much more difficult. The only possible method of repair is to anastomose the stump of the common hepstic duct

at the hilus of the liver to a loop of intestme. Is ability to obtain a good anastomous and the lact of an appreciable amount of duct wall are largely responsible for the poor results in plastic procedure when no duct can be found Cholangin is the pathological lesson feared in any repair of the tipe. while an even greater danger is the development of multiple abscesses of the liver The author are a the onlinion that in addition to the tendency for stricture formation to occur refins of food mai intestinal secretion into the intrahepatic does in very important in the development of chokarita Therefore they attempted mechanically to preme reflux of food up through the line of anastomers has the liver by isolation of the area from the level stream.

Two methods of reconstruction were emploid to accomplish this (1) amastomosis of the bits stump to an arm of the lejunum after the Ron principle and (2) attachment of the biles to a less of jefunum in which an anastomore is performed between the two loops at a distance from the kins anastomosis. Better results were obtained by somtomosis according to the Roux principle with the single arm of jejunum. The stump of the bersty duct at the hilus is approached by staying the the ventral surface of the liver and working from the lateral side. After the stump is located the jelman is severed about 1 foot or more from the luminent of Treits. The dutal end is closed by inversion with single line of continuous catgut suture. The end of the proximal loop is then adaptomosed to the conloop at least s feet from the end which is to be attached to the duct at the hilus of the liver little mesentery of the distal loop of Jerunum is not lost enough to permit approximation to the bilm of the liver without tension an opening is made is the mesocolon and the arm of jejunum is doesn't through this opening. The opening of the counter hepatic duct at the hills is dilated to a size with will allow introduction of the funnel and of the vitallium tube. The right and left hepatic date can be located by probing and occasionally the bad wil be found to divide so close to the hilus that the ordinary tube will be blocked by the septum between the ducts. Under such circumstances a take with a Y-end should be used so that each duct is cannulated. A purse string suture of silk is place around the end of the duct and the tube inserted Tying the sature should anchor the tube serured A purse string suture is then applied around the center of the line of closure at the end of the arm of jejunum. A small opening is made about a inches from the end of the jefunum and with a carre Pean forceps inserted into the fejurum and of through the closed end, the end of the vitallium take is grasped and pulled into the end of the intestive The purse string suture is then tied. Interrupted sutures anchor the end of the intestme against the hillus of the liver Two or three valves or beffer are made in the arm of the jejunum to prevent upand reflux of the intentinal contents.

Anastomosis of a loop of Jejunum to the stump of the hepatic duct at the hilus requires less operating time than the anastomosis of the Roux type but 3 of 4 patients surviving this type of operation de veloped chills and fever after a variable time. This rpe of anastomosis is not recommended unless an fective valve or baffle is placed in both arms of the oop particularly on the proximal side. An enteromaxiomosis must be made between the two loops of intestine at least 12 inches away from the anasto-

means between the duct and the jejunal loop, The authors have inserted 14 vitallium tubes in the treatment of stenosis or absence of the common duct. In 5 cases the Roux Y principle was used The results in 4 of these 5 patients were from good
excellent. The results following the use of a loop

Jejnnum for the anastomosis were not so satus ctory and chills and fever were common In 3 atients the proximal loop of the lejunum was inter apted at a later operation following which there ras abrupt cessation of the chills and fever in 2 atients. The operative mortality for 14 cases was

It is concluded that the best operation in the type of patients in whom no common duct can be found 143 per cent. n anatomosis of the stump of the hepatic duct to a single arm of the Jejunum which is at least 24 inches long and the walls of which have been folded to produce valves or baffles. Prevention of obstruction by the use of a tube did not prevent the occurrence of chills and fever unless reflux of the food was pre vented by the operative procedure. The vitallium tube has a definite place in reconstruction of stric tures and absence of the common duct, but it is indicated primarily in patients in whom no common duct whatsoever can be found and in patients in whom the common hepatic duct cannot be found JOHN L. LINDQUIST M.D.

# trunschwig. A. and Bigelow R. R. Advanced Carcinoma of the Extrahepatic Blie Ducta; Advanced Choleanglocholecystocholedochectomy

Seven patients presenting advanced carcinoma involving most of the extrahepatic bile passages and extending into the gall bladder and without apperent diffuse peritoneal spread or hepatic meta times, were subjected to radical resection of these ducts and of the gall bladder In one instance a portion of the head of the pancreas was also resected The purpose was to ascertain if palliation might not be afforded in this rather hopeless condition if most, or all, of the macroscopic neoplasm was removed.

The procedure a choleangiocholecystocholecone chectomy was carried out under continuous spinal snesthesia supplemented by ethylene and ether if

1 A high midline or reverse L incision necessary It consisted of 2 Aspiration of the gall bladder if necessary to

3 Direction of the gall bladder from the liver bed facilitate access to the porta hepatis. and if it was extensively involved by carcinoma,

wedge shaped resection of a portion of the liver about Application of hemostate to the gall bladder the rall bladder

and traction upon it to elevate the mass in the porta

5 Isolation of the lower segment of the common duct behind the duodenum after mobilization of the hepatis duodenura and head of the pancreas from the lateral

6 Transection of the common bile duct behind the duodenum, and incisions into the head of the pancreas to mobilize portions invaded by carcinoma.

7 With the hemostat applied to the upper seg ment of the transected common bile duct, dissection was carried out upward to free the involved extra hepatic bile ducts from the surrounding arealy tissue. This is the most precarious stage of the operation because of the danger of opening the

8 Transection of the right and left hepatic ducts portal vein or hepatic artery at or just beyond their emergence from the liver and

noval or the specimen or catheten so as to create removal of the specimen. a junction between one or both hepatic docts and

e common quet sourvived the operation from 3 months the common duct stump to I year The icterus deared or was partally in lieved in all. There was some pallation in 22 4 patients, but in I the general condition we deer

ating The results achieved by radical errance in these patients with advanced extrahepatic heary com orating patients with automatic attention of the very our carcinoms to me preming this situation. Alternative outlook concerning this situation. mistic outnose concerning the mistic outnotes was ameliorated in those arms the mistic outnotes was ameliorated in those arms the mistic outnotes with the mistic outnotes icterus was amendrated by not specially action, survival was probably not specially and ation, survival was provided in a rabul provided the possibility of a rabul provided and beauty thened. The personal this region is demonstrated, and in personal this region is demonstrated. this region is demonstrated district the presence of more localized district the the presence of most property increase the opportunity for more property of such patients. On the of- text prival of such patients of the pati vival of such patients may cree frequency with which interus may cree and frequency with which the course of this duesse adds grath the culties of diagnosis at an early stage TORN L. Lry- --

# Wechsler H. F. and Weimer J Linearies, Lithlands A. Report of 2 Cont. France, Adults. Gentromerology 1945 Feb.

The authors believe it is comme pancreatic calculate the condition are age of 40 and that the condition are agreed to sidered as a possibility among by sidered as a promp However fire younger are group However fire wale 28 years die younger white male 28 years die white male 27 years of age Both prowhite mair widences of proboth had a long history of digestar abdominal pain the symptomic of 8 and 10 years respectively of 8 and 10 years and progressive disease is any that the demonstration of cake

that the symptoms had been present for a consider able period of time. The etiology is unknown and the authors state that alcoholism cannot be the sole cause of the disease.

Both of the patients had suffered since childhood with intermitiant attacks of upper abdominal patin associated with bloating nauses, and vomiting. The pain was not relieved by esting and it was aggravated by fried or greasy foods, and by a large meal. Between attacks both patients complained of a dull soreness in the epigastrium, especially on arising in the morning. Neither of the patients had lost weight. There was no glycosuria nor saundice, and no evidence of hyratic dysfunction.

The rocaigenological findings in both cases were classical and of the most common type of pancreatic lithiusis. It is emphasized that patients with this condition may have a history of abdominal symptoms dating back to childhood.

EMIL C. ROBITEMER, M.D.

Mascheroni H A., Reussi C. and Clerici, L. E.: Failure of Surgical Treatment in a Case of Thrombophishitis of the Spienic Vein (Trombofelvitis de la veta spienica fractas del tratamiento quimprico en una observacio) Ren As well ar rest 043 50 10 5

Thrombophiebitis of the spieme vein alone is quite rare it may be prunary due to blood diseases or primary phiebosclerosis it may be secondary following compression by cysts or tumors, or from propagation of neighboring infections, such as puer peral infection, appendictis, or ulcer of the storach or it may be brought about by retardation of the circulation in general diseases such as cancer ma larts, or tuberculosis, or in a local circhosis of the liver

It is important to differentiate between philoitis of the splenic vein and that of the portal vein be cause surgery is indicated in the former and con traindicated in the latter. In philoitis of the trusk of the portal vein there is at first an asotes which later disappears hemorrhages from the hemorrhoidis and possibly the splenic arteries and a collateral circulation around the unbillious. When these signs do not exist the philoitis is probably splenic. There is apt to be repeated womiting of blood in both forms. Diagrammatic sketches of the two forms are given. On opening the abdomen the surgeon should confirm the probable clinical diagnosis by examination of the portal and splenic veins.

Eppinger operated on 14 cases of phlebits of the plenie vein with the following results 4 patients lived more than 10 years, 3 lived more than 5 years, 3 ded soon after the operation, 2 ded in the course 12 years and 3 were well a year and a half after the

operation but were not examined further.

The authors describe a case in a girl f 13 years who for several years had had repeated attacks of vomiting of clots of dark red blood. She was an in tractable patient, and examination and treatment were difficult. On admission she had fever and a

spience anomic with very great enlargement of its spience, which decreased in size after each sense mage and after the injection of adreasin. Spience thanks and after the injection of adreasin. Spience to my was performed January 10, 1014. On the 2 1045 she began to have colleky addomnated to followed by copious benatements and a small night pulse. She died on the might of February 3, Historical Confession of the might of the property of the confession of the trunk of the portal as well as of the trunk of the portal as well as of the pulse of the trunk of the portal as well as of the spient vertice.

Bukh H., and With, T. K. Splenectomy in Chrusic Nonleucernic Myeloid Splenomajny with Report of a Case with Osteosderus. Ada chir scand 945, 92 507

Chronic nonleucemic myeloid splenomegaly is briefly described and a personal case in white splenectomy was performed is presented.

The risk of performing spiencetomy on this is dications in this disease is stressed, and a owner 54 cases of chronic nonleucemic myeloid spienmegaly from the literature in which spiencetomy ass performed is given.

As the result of the operation in these cases very often is death and true benefit to the patient's sedom achieved splenectomy should be carried out for this disease only on certain narrow indications.

To avoid splenectomy on false indications, spices puncture is necessary it may be carried out with very small risk with the technique of Emile-Well as his collaborators. In all cases of Bantils dissert (even apparently typical ones) in hemolytic jundice and in essential thrombopenic purpors, spices puncture should be carried out before splenectors is decided upon.

#### MISCELLANEOUS

Hudson, If N G : Closed Intra Abdominal Islany Brit. If J 945 4 9-

Three cases of visceral injury resulting from hist different types of blant force to the abdones are ported. In one finatance the features was repland as the result of a sharp glanding blow on the related abdonem in another case rupture of the full stosed by force of a powerful crushing nature was full in the third case the sphen was replared as the result of a sudden kick on the elastic overlying his.

WALTER H. NADLER, M.D.

Ewing, W. M., and Betts, R. H. Thoraconbdomical Injuries. Ann. Surg. 945 793.

Thoracabdominal injuries have shown a mir mply high mortal ty rate. Jolly reported a metality of 61 5 per cent in of cases and slicks, is reviewing 83 cases from the To isian and Izian campaigns, Jound's mortality rate of 48 per cent. Inasmuch as recent reports of abdomnal rawounds have shown a considerable decrease in mortality from the results of World War I and thorse things in the present war have not been fatal as often as form by the author believes that thorse-order as form the father of the state of t

abdominal injuries should likewise show a reduction m mortality rate.

A true thoracoabdominal injury signifies that the missile has traversed both the pleural and pentoneal spaces and has penetrated the diaphragm author believes that if separate missiles have entered ach of the cavities and the diaphragm is intact, aca or the cavines and the combined thorace, the condition should be termed a combined thorace.

in a 10 month period during the Italian campaign in 1943 and 1944 31 thoracoebdominal injuries were and abdominal injury treated by a thoracic surgical team in a field hospital. The patients had been seriously wounded and could not safely be evacuated. Of the 31 patients, 19 were operated on with 6 deaths a mortality of 10.7 per cent. Two were not operated upon these, one was transferred to another installation The second patient had a left thoracoabdominal in jury a right traumatic thoracotomy traumatic amputation of the right arm and a serious right thigh wound. In spite of 3 500 c.c of blood and 500 cc. of plasma, the blood pressure never was attained and the patient died 5 hours after injury without coming to surgery

In 10 cases the lesson was on the right side and in 18 cases, on the left side. One case was blaters, the same mustile having traversed the abdomen and both pleural cavities In the 10 right saided cases the liver was injured in every instance and was practically the only organ involved The right kidney and adrenal were each injured once Of the 18 left sided cases the spleen was injured in 10, the stomach in 8 the coloning the liver in 7 the jejunum in 4 the pancreas in s and the adrenal in 1 case. In the patient with bilateral injury the liver was the only abdominal

In 22 patients the injuries were produced by fragments of high explosive shells or bombs and in 7 organ involved

The authors state that sufficient evidence of thoracoabdominal injury to indicate operative inter ference is in most instances unmistal able Thoracic involvement is usually apparent a through and through wound of the costal cage or roentgenegraphic evidence of an intrathoracic foreign body Abdominal injury by a missile whose site of entrance h thoracle may be more difficult to determine. Perforating chest wounds may leave doubt as to the presence or absence of peritoncal perforation Penetrating must be located by posteroantenor

In questionable cases, physical signs are of little Abdominal pain and rigidity are so often and lateral x rays present in thoracic cases that they cannot be relied upon. Peristaisis suggests that injury to a hollow viscus has not occurred but occasionally it is present in patients with abdominal injury confined to the are or spleen, or the large bowel Pneumothorax and pneumoperitoneum as diagnostic aids are not

It is just as necessary to explore any doubtful practical for the acute phase. thoracoabdominal injury as it is every questionable

abdominal penetration Even if no hollow viscus is pencirated a damaged spleen may be fatal or an overlooked perforation of the liver may cause a bile empyema Any missile larger than 3 mm. in the liver may produce enough damage to warrant exploration The choice of surgical approach depends on three

factors (1) whether more extensive damage is ex pected in the chest or in the abdomen (2) whether the damage can be repaired easier from above or below and (3) the personal choice of the physician which is dependent upon his training and experience.

The advantages of the transthoracic approach are (1) if there is much thorace damage as well as abdominal damage the thoracic part cannot be done from below (2) certain upper abdominal leatons are more easily handled through the diaphragm (5) diaphragmatic repair is best accomplished transthoracleally (4) it permits externorization of the colon through a subcostal gridinon incision at a greater distance from the operative incision than if a celiotomy is done (5) postoperative pain is less severe from a thoracotomy than from a cellotomy (6) the patient can be carried in light anesthesis as abdominal relaxation is not necessary (7) although not apparent at first, considerable damage to the

intrathoracic organs may be present. Two factors favor the abdominal approach (1) it is indicated to repair lesions of the lower ileum, cecum ascending lower descending sigmoid and hepatic flexure of the colon and (2) if the thoracic hepatic flexure of the colon and (2) if the thoracic disturbance is minimal and operative interference is not indicated abdominal exploration prevents enter

Certain lessons are best done from above and ing another serous cavity questionable cases should be done from above, and others from below that one should not hesitate to do both a cellotomy and thoracotomy He opposes division of the costal cege to extend a thoracotomy incision on to the abdomen as it makes an unstable chest and increases the chance of postoperative pneumonia.

It is important to secure an air tight closure and stable thoracle cage complete and rapid re-expansion of the injured lung and maintenance of a clear tra cheobronchial passage during the postoperative pe H a surreon cannot accomplish these objec tives he should use the abdominal approach

A skilled anesthetist is a must for thoracocellot omics and the use of an endotracheal gas-oxygenether closed system is the author's choice.

For a thoracotomy incision the author uses the eighth to the tenth rib depending on the exposure

Careful closure of the diaphragm is essential and the author suggests a two-layer imbrication with destred

interrupted cotton or silk sutures. Temporary paralysis of the phrenic nerve by crushing enhances healing and the author has observed no unloward pulmonary complications at

tributable to the diaphragmatic paralysis. Liver lesions should be packed and drained sub custally in such a manner as to provide dependent drainage. Failure to do this may lead to bile peritonitis. Closure of the chest and lung re-expansion are of

basic importance in a transthoracic procedure and the author discusses his method of chest closure. In some cases the chest is drained under water usually by a catheters one anteriorly and one posteriorly in the second interspace. If not drained the patient must be frequently examined and any accumulation of air or fluid must be aspirated. In the present series the average number of aspirations in drained cases was 23 while in the undrained cases it was o 8 The author does not drain except in unusual cases, and he has found that complete early lung

expansion is more often achieved without drainage. There are a important points in regard to the postoperative care of the thoracic phase of thoracoabdominal injuries. The first is removal of air and fluid in the chest until complete lung expansion is achieved. The second problem is that of the removal of bronchial secretions, in many by bronchoscopy at the completion of operation. This was done in as of the 20 cases. In the ward signs of excessive bronchial secretion should be combated by supporting the patient's chest to make coughing more effectual this is not effective traches aspiration by catheter is tried and as a last resort, bronchoscopy. So im portant is this postoperative treatment that the author feels all members of the thoracic surgical team should be competent bronchoscopists. third factor is the control of postoperative pain which should not be severe in a thoracocciliotomy when the intercostal nerves have been paralyzed. Pain is better controlled by paravertebral intercostal nerve block than by resorting to morphine Of the 6 fatal cases I patient died of uremia on the

third postoperative day. At necropsy this patient had a large infarct of the kidney. One patient died during bronchoscopy after operation probably of vagovagal reflex" i died on the second postopera tive day of a fulminating purumonia another died of

strangulation on the ward the fifth patient died of

uremia on the third postoperative day. The less fatality in a patient with a right pneumothorur, a left thoracoabdominal injury a spleen injury and transection of the jejunum and colon, occurred on the operating table. The patient was in given shock with gross contamination of the pleural and peritoneal cavities, and failed to survive the occu tion even with adequate blood replacement.

The average time-lag from injury to operation was 8 hours for the fatal group and 11.4 hours for the nonfatal group which would indicate that probably the more severely wounded died before reaching my

medical installation.

Three of 8 patients with colon injuries ded (37 5%) but in only 1 patient was this the primary cause of death. Five of the 18 patients with left sided lessons (27 1%) died as compared with the figure of 9.1 per cent for the death of the o was right-sided lexions. These figures mirror the iscreased seriousness of left-sided lesions.

The death rate increases with the number of abdominal organs injured. One death in 15 (6.6%) or curred in this series when one viscus was injured, while 5 deaths in 14 (35 7%) occurred when 2 or more abdominal organs were injured.

From these cases the author draws the following conclusions

1 \n expert physician anesthetist experienced in administering intratraches! anesthesis is invalente

for the proper function of a surgical team treating thoracoabdominal injuries. 2 Fatalities rarely occur on the operating table. They are usually the result of postoperative pul-

monary complications necessitating tracked or bronchial aspiration by catheter or bronchoscopy 3 Pulmonary re-expansion after a thoracir oper-

tion is of utmost importance and must be pursed vigorously until the end is attained 4 Prolongation of the time interval from injury

to operation is not as significant in respect to mortality as are the factors of proper anesthesis and ROBERT R. BIGGIOW M.D. postoperative care.

# GYNECOLOGY

# UTERUS

McLennan C. E : Results of Various Types of Treatment in Adenocarcinoma of the Endometrium Am J Obst 1945 50 254.

The results of treatment in the University of Minnesota Hospital of 225 patients with adenocar choma of the uterine corpus have been reviewed One hundred and eleven of these were seen more than five years ago No patient has been lost in the

The absolute 5 year cure rate has been 45 per follow-up program. cent including certain patients previously treated elsewhere. The exclusion of the latter patients does

Poor results are shown to follow the routine use not improve the end results of radium and x ray alone Certain patients so treated may be salvaged even many years later by hysterectomy for recurrent or persistent carcinoma Good results have followed the use of total hys-

terectomy with or without preoperative or post

Since the beginning of 1939, only 53 per cent of operative irradiation. the patients have been able to go through a planned standardized routine of treatment. The reasons which necessitated modifying the standard therapy are shown in detail. Approximately 70 per cent of the patients were given what might be termed adequate treatment, in the sense that total hysterec

In the past 5 years only 1 patient of the group receiving routine or standardized treatment has died tomy was performed

The operative mortality for the entire series has of recurrent carcinoma. been \$8 per cent, or 3 per cent, corrected. The results in terms of immediate morbidity and mor tality in 38 patients who were given full tolerance does of deep x ray preceding intrauterine adminis tration of radium and hysterectomy were undesir able. It is suggested that preoperative deep x ray therapy will add nothing to the ultimate cure rates No conclusions can as yet be drawn from recent

experience with the intrauterine administration of radium and total hysterectomy in 4 to 6 weeks

The final results in the treatment of carcinoma of the uterms corpus are predetermined to a consider able extent by the nature of the material presented for therapy in terms of metastases medical and surgical complications age, weight and nutritional status.

# ADNEXAL AND PERIUTERINE CONDITIONS

Brevfoule, H. S. Death from Air Embolism fol lowing Insuffiction J Am If Ar 1945 129

The author reports the fourth case of air embolism resulting from vaginal insufflation during pregnancy

Previously 1 case from Canada and 2 cases from

Fugland have been reported in the literature In the present case I per cent of silver picrate in

kaohn was insufflated with a Shelanski insufflator into the vagina of a woman who had been pregnant for a period of seven months In 5 minutes the pa then developed pallor dyspnes, cyanosis, and sud-tient developed pallor dyspnes, cyanosis, and sud-den collapse.

Postmortem examination revealed gas bubbles in the symptoms the patient died the right suricle and ventricle of the heart, edema and congestion of the lungs with an infarct in the

It is supposed that air entered the systemic venous left lower lobe of the left lung circulation at the site of the placental implantation and was carried directly to the right cardiac auricle.

Some experimental work was carried out and it has been estimated that under positive pressure 500 c.c. or more of air was injected into the pregnant uterus within a brief interval, thus producing the fatal air embolus

# MISCELLANEOUS

Clayton S. G. Carcinoma of the Female Urethra on 8. G. Carcinoma of the remaie orethra Review of the Literature and Report of 3 (Review of the Lateracine size supplied of Cases) J. Obd. Gyr. Bril Empire 1945 52 508

Urethral cardnoma appears to be more common in the female than in the male Nichol stated that in the remain than in the made and account that is 149 cases had been reported in males and 262 cases in females. Hamann and Goebel found that it ac counted for o 16 per cent of gynecological carci nomas, but Menville found only 1 instance among

Urethral carcinoma is usually a disease of the 43,000 gynecological cases. postmenopausal woman the average age in 100

The disease is mostly seen in parous women, and cases being 53 years. following Ehrendorfer most authors have mentioned trauma or chronic inflammatory processes as etiological factors. Urethral caruncle is sometimes sus pected to be a predisposing lesion but in view of the frequency of occurrence of caruncle, it is hard to be sure that the supposed relation is not merely that Whitehouse divided the cases into urethral and of chance.

vulvourethral types, and the latter are found about twice as often as the former Whitehouse a account of the gross pathology is still one of the most valu able and it is difficult to add much to his description. Urcikral carcinoma. This is seen in two common

forms (1) in the usual form the growth appears as a malignant ulcer in the urethral floor most often in the distal urethrs, and (a) the less common form is that of perturethral induration extending for some length along the urethra with late ulceration I strongeleral carcinoma This occurs in 3 forms

(1) a vascular papillomatous nodule at the posterior

margin f the unthral orifice (2) a nodule that I reaks down t an ulcer in the vestil ule and (3) a scirrbous induration around the urethral orifice.

On microscoj ical examination the neoplasms are found to be of various types squamous cell care; nome columnar cell extendents both simple and adenocarcinoma), mucoid carcinoma and undiffer entasted types. In most of the series the squamous cell carcinoma predominates.

Menville has stressed the similarity of the growths

to neonlasms of the bladder

Urethral carcinoma does not produce much descomfort in the early stages and even after series symptoms appear there is often so much delay before advice is sought that extension to the bladder, vigina or lymph nodes may have already occurred

when the patient is seen. Perhaps the most common of the early symptoms is painful micturition. Difficult micturition or retention may occur in other cases, frequency Bleeding is a common symptom more especially with micturition. Local tenderness and dyspareunia also occur with the more superficial growths. Some

f the patients may report a swelling in the region

f the urethra.

On examination the growth may be seen project ing from the urethral ordice or in other cases it may be felt per requises as a line of induration along the urethra. Enlarged inquinal glands are found in about so per cent of the cases at the first examin ation. Biopsy is the final and recutial step in

As regards the primary tumor, the choice lets as surgical excision and irradiation is obviously afferded by the position and extent of the growth. If the posterior urethra is lavolved the growth can be enset only at the cost of permanent incontence, irradiation has less operative risk, although there is a possibility of both fistula formation and incoming the radioensativity of the growth varies with in

type and although it is generally stated that the squamous cell types are sensitive there is less agrement about the columnar cell types. As regards the inguinal glands, there is the same

choice between surgical exercison and fundation, and also there is fairly general agreement that sorgery offers the best results. The nodes are often inleted, and the overlying skin may not tolerate the largdoses of radiation necessary to reach the glands in their fatty bed

The results in general are disappointing Spath and Parsons for example, found only 1,9 survivos among 110 patients after 3 years. Tassing reports 14 cases, and in 5 of these the dusease was too idvanced for treatment. Of the 18 patients treated, 8 were subjected to Irraduction, with only 1 surveil, and 3 were treated by excision of the primary groats with Basset gland dissection all 3 surveils on the with Basset gland dissection all 3 surveils.

Three cases are reported,
DANIEL G MORTON, M.D.

## OBSTETRICS

### PREGNANCY AND ITS COMPLICATIONS

Greene, G. G.; Abdominal Pregnancy; 3 Cases Near or Past Term and 1 Case of Early Abdominal Pregnancy South M J., 1945 38 74

In abdominal pregnancy the problem of delivering the fetus is usually simple but that of delivering the placenta requires a difficult decision. There are three methods of approach namely (1) marsupialization of the placents (2) removal of the placents and (1) leaving the placenta in place. The first has been discarded by most experienced obstetricians of today because of the greater risk of infection in a wound which may be open for many weeks Removal of the placenta places both the patient and the operator in a dangerous position. On first inspection of the placental attachments one may think that the placents can be removed with ease, and find, too late that there is an unsuspected attachment which in volves a vital area. Such meddlesome surgery may cost the life of a patient who could have been spared

The 3 cases of advanced abdominal pregnancy presented bring out what seems the most desirable method of caring for the placents. In these the cord was cut short and tied. As much of the membrane as could be removed was cut away. The placenta was left intact and the abdomen closed tightly with out drains. Complications may arise and it may even be necessary to do a second operation for removal of the placenta, but this can be done with greater security later as the placents will be in a degenerative stage and possibly detached and lying free in the abdominal cavity Occasionally suppura tion may occur but this can be taken care of by simple drainage.

Since hemorrhage is a primary consideration what ever the approach the patient should be thoroughly fortified against it prior to operation. Anspach and others have agreed that the optimum time for operation is from 6 to 8 weeks after the fetus is known to have expired. This, of course is desirable if the placenta is to be removed but does not seem neces sary in most instances. The placenta will be absorbed by the body if the hands off policy is followed

Abdominal pregnancy can be diagnosed with less difficulty if one suspects it in any case which does not seem just right.

\-rays are very valuable when used in advanced abdominal pregnancy especially when a diagonal or other peculiar position of the fetus is noted

Alertness of the obstetrician and early diagnosis may save more infants. DANIEL G MORTON M D

Greene G G A 7 Year Review of Eclampsia with Special Reference to Treatment with Veratrum Viride. Am J Obd., 1945 50 427

Of the 150 patients in this review 104 were primi gravidas. This group of cases revealed that true eclampsia is far more frequent in the women in whom chronic kidney damage has been present for some time. Verstrum viride is not of much value. In more than half of the patients the eclampela began in the antepartum period.

During these 7 years every method of treatment known seemed to have been given a chance at one time or another

In the year 1937 many cesarean sections were done. It was in this year that the mortality reached its highest peak. Nine sections were done in 20 cases (45 per cent) that year Seven of the 9 patients ex pired. Five of the 7 were treated in the hospital for only 24 hours or less before operation was performed All of these expired. This emphasizes the urgent need for control of the eclampsia before any opera tive measure is attempted

Fifteen cases were seen from 1941 to 1942 in clusive. Fourteen of these received veratrum viride All of the patients recovered. The patients are treated without giving them any morphine or bar biturates Paraldehyde per rectum is the choice method of anesthesis. It was found that after treat ment had been started 50 per cent or more of the nationts did not continue to have convulsions or at most they had only a convulsions and in a short period of time they were rational and responding to questions

No attempt at delivery should be made until the convulsions have been controlled and the patient is rational for one or two days. A number of these cases will go into labor spontaneously during this period if not the induction of labor can be ac complished by the simpler methods, with drugs or some minor operation such as rupturing of the mem branes. A very small number of cases may not respond to any of these. If the patient is a primipara near term with a closed thick cervix cesarean sec tion can be considered and performed rather safely provided the eclamptic state has been controlled for a time but the patient is beginning to show evidence of returning to her former condition by a rise in blood pressure, an increase in albumin, and casts in the urine The author does not like to use bag in ductions in primipares for this or any other reason.

Eclampsia is a complication of pregnancy pre valent mostly among the young negro women in the South as the result of improper prenatal care.

EDWARD L. CORNELL, M.D.

Macaice, C. G. Il : Placenta Previa A Study of 174 Cases. J Obn Gyn Brit Empire 1945 52 313

Since 1937 all cases of antepartum bleeding ad mitted to the Belfast Royal Maternity Hospital have been treated under the direct supervision of the author. In this article he reports the results of the treatment of 174 cases of placenta previa which were classified as to location as follows Type I (low-lying)

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TABLE I METHODS OF DELIVERY

	Ne of Caper	Staff- births or deaths	Per rest
Artificial rupture of membranes	52	7	3 4
ARM and Willett sforceps	0	0	47 4
Vermon		17	77 3
Cesarean section	68		3 0
Breech	6	5	83 3
None	7		14 3

50 Type II (marginal), 37 Type III (partial) 46

and Type IV (complete) 41 The physician who first sees a patient with pla centa previa is responsible for getting her to a hospital where suitable treatment can be administered The type of placental implantation can be determined and the program for treatment outlined only after careful vaginal examination. The time when the vaginal examination is made, however is of utmost importance to the final outcome for the baby Since many cases of placents previs manifest themselves early in the last trimester of pregnancy and since most of the infant deaths are due to prematurity delay in treatment to allow the baby to grow should increase the survival rate. The author contends that severe hemorrhage particularly in primigravidas, and further separation of the placenta usually follows vaginal examination, and cites several cases of "silent previas discovered at cesarean section for other conditions. The small hemorrhages which may occur from time to time in the unexamined patient are of little consequence

If the initial bleeding occurs near term no time should be lost in initiating treatment but several being caramheed. The average brits well as the large treatment but several being caramheed. The average brits well of the infants in the first 147 cases delivered at the time of the first bleeding was a pounds a ouncess with a fetal mortality of 47 per cent, and in the last 47 cases observed and examined later 6 pounds 13 ounces with a mortality of 6 per cent. The total fetal mortality and was 83 x per cent, as compared to x3.

ner cent for the previous 4 years.

The author states that the aite of the insertion of the umbilical cord into the placenta is of importance in fetal survival. If the cord is inserted low the baby is likely to die, whereas it usually will survive if the cord is attached high, on the portion of the placenta which remains adherent to the uterine wall.

The methods of delivery with the associated fetal mortality are outlined in Table 1. The lower segment cessrean section is preferred, but care should be taken that the placenta is located before the uterine inclision is made so that it is not incised

J ROBERT WILLSON M.D.

Vartan C. K.: The Behavior of the Fetus in Utero, with Special Reference to the Incidence of Breech Presentation at Term. J Ohn Gyn. Brit

Empire, 1945 52 4 7

Studies show that spontaneous cephalic version from a breech presentation normally occurs during

pregnancy It was formerly thought that breek presentation occurred most commonly when there was a decrease in size of the pelvic cavity bot observation of the cases shows that the faties which prevent spontaneous version are the real citological factors which persist to term.

Three theories formerly held to explain un cephalic rather than breech presentation occurs are

contradicted

1 The statement that the smaller circumferers of the breech at term causes it to present in a small pelvis rather than the head is refuted by the observation that presentation is decided long before the fetus attempts to enter the pelvic brim.

2 The theory that the smaller circumference of the fetus adapts itself to the small end of the stems is refuted by the observation that the uterus at tens is not pyruform especially in the multigravids or is

hydramnios.

3 The argument that gravity causes the best present rather than the lighter breech is related by the observation that breech presentation is such more common early in preguncy than later as that the woman's upright position is not constant maintained.

One thousand cases of breech presentation ocur ring during some period of pregnancy were observed in a series of 3.874 patients. Breech presentation b regarded as a common occurrence up to the thirty fourth week of pregnancy, with spontaneous critain version between the thirty-first and thirty tibi weeks in most cases. In this series spontaneous exp alic version occurred in 680 of 1,000 cases. The inflaence of parity on spontaneous version is unimportant; in this series the incidence was equal m primipant and multiparas. Reversion seldom follows spoatzaous version it occurred in this sense in only 15 women, most of them primiparas, of which underwent a second spontaneous version. Extern version has a higher reversion rate than spontaneous version of 330 cases in which external version and done as per cent (77 cases) had a reversion to breek presentation Other observers have arrived at figure of 33 3 and 21 per cent. External versions performed after the thirty third week show a lesser tendency to reversion than those done earlier among 22 per cent of falled versions in this senses, 36 cases presented by the breech at barth, 28 had spontaneous reversion and 13 were reverted by the obstetrican The majority of persistent breech presentations show an extended attitude at term a small propor tion show very little liquor (in this series 3%) most

of them occur in primipatars (3; in this series). Spoul ancous podule version occurs occursions[1] it was observed in 134 cases (3,4%, of the total \$8,75) and in 45 of these is occurred as a missi movement, one-fourth of the cases readjusting therefore, No organic or other factor was appetred influencing spontaneous podule version, but of 8 breech presentations at both 1a cost of the 51 unbernsided bytech deliveries the infant was strillored.

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Patients should be informed that the breech presentation is normal at a certain stage in the pregnancy furthermore it should be realized that spon taneous version occurs in 3 out of 5 patients. The cause of spontaneous version is not as easy to explain as the cause of its nonoccurrence. It apparently happens that spontaneous version does not occur (1) when the fetus is abnormal or premature, (2) when there is little liquor (3) when the limbs are extended and (4) when twin fetuses mutually

prevent each other from turning

In performing external version one must induce the fetus to undo its extension and then to turn it rather than to attempt to force around an inanimate object of the wrong shape. Gentle cephalic pressure will induce vigorous movements and often undo the extended attitude. Gentle pressure on the facial aspect and backward turning is often successful when forward version fails and may be repeated weekly or oftener Anesthesia is inadvisable and unlikely to help in most cases. Accidental hemorrhage at the time of version is very rare. The incidence of death because of dystocia in breech delivery is no higher than in the case of vertex delivery The mortality rises when a difficult delivery a added to a breech presentation, and no woman with a large baby in persistent breech presentation in the extended attitude should be allowed to de liver herself

Skigrams have been most valuable in breech cases for determining the fetal attitude and the amount of liquor and therefore have aided in the subsequent management of the case whether it be induction of premature labor or casesarean section at term. Printip B Crass, M.D.

O'Driscoll, D.T.: Acute Hydramusios. A Brief Survey of the Recent Literature, with the Report of a Case Simulating Concealed Accidental Hemographies. J. Obs. Gyn. Bril. Empire. 1945, 52 496.

Acute hydraunies has been reported go tunes in the literature. The cause is atill unknown. The annichte fluid is generally regarded as of dual origin. On the maternal side the fluid comes from the blood plasma and is probably changed by its passage across the placents and aminon. The aminon is capable of true accretory activity The fetus probably contributes by unnary secretion and by transudation from the letal surface and umbilical cord. Under normal conditions the fetus also probably helps to regulate the amount by its constant swallowing of higher with the subsequent passage of excess fluid into the fetal circulation and across the placenta into the maternal blood stream.

In hydramnios therefore, pathological conditions both on the maternal and on the fetal side may be tiological factors

Analysis of the last 40 cases of acute hydramnios that appeared in the literature revealed the following associated conditions 8 cases with twins 7 cases with anencephalus 2 cases with teratoma of the

neck I case each with multiple deformaties, atreas of the esophagus congenital adenoma of the lung and hydrocephalic anophthalmic monster. The conditions present in the mothers were ascariasis appearing acutely in puerperium diabetes mellitus and eclamosia.

In this article, the author reports 1 case of scute hydramnios simulating concealed accidental hemor rhage. The patient was delivered of a stillborn

anencephalic fetus

The case is of particular interest because the patient presented a typical picture of concealed ac cidental hemorrhage. Not until the membranes were artificially ruptured and the ammotic fluid was forcefully extruded was the diagnosis made. The symptoms were sudden severe abdominal pain with vomiting. On admission to the hospital the patient looked pale and shocked. The abdomen was extremely tense hard and tender occasional painless contractions were palpable. Rectal examination revealed the cervix to be closed. The uterus reached to two fingers below the xyphoid.

The main points in the differential diagnosts be treen acute hydramnos and concealed accidental hemorrhage are (1) the duration of the symptoms, with a slower onset in hydramnics (2) abdominal calargement, greater in hydramnics (3) hallotte ment will favor a diagnosis of hydramnics (4) in vestigation of the previous history (5) abdominal puncture of the uterus by a fine needle (Courtois) Other conditions requiring differentiation as

ovarian cysts ascites and multiple pregnancy. The treatment of acute hydramnios is usually conservative. If the fetus is normal, an effort is made to carry the pregnancy to term. This can be done occasionally by frequent decompression of the uterus by the technique of Courtois. If the pregnancy is at term or the fetus is deformed labor may be induced

Draining of the fluid, either through the abdomen with a needle or by rupture of the hind waters with a Drew Smythe catheter, is recommended by the author as a desirable method of inducing labor

The author concluded that acute hydramuos occurs in patients who would develop hydramuios in any case but because of the introduction of an additional factor the symptoms arise acutely. The additional factor is a uterine musculature that is oversemsitive to undue stretching caused by the presence of an extra amniotic sac or traums.

HARRY FIELDS, M.D.

Burch A. E.: The Association of Erythroblastosis Fetalis and Accidental Antepartum Hemor rhage J Obst. Gyn. Bril Empire 1945 52 463

It is concluded from the evidence in two senes of cases that Rh negative women are abnormally prone to have accidental antepartum hemorrhages. It is also postulated from the series that the ensuing placental damage may be the factor which produces erythroblastosis in the offspring by allowing the transplacental passage of antigen and agglutinogen. In so of a case of expirabilastosis feals in the Oneen

Charlotte Hospital series reported there was an associated premature placental separation and antepartum hemorrhage the association of two such rare conditions seemed significant although the number of cases was small

Among the 10 cases of accidental antepartum hemorrhage reported from St. Alfere a hospital s of the women were Rh negative and had Rh positive husbands and a had anti Rh agglutining. Three of these women had a hemorrhage just prior to de livery and 1 of them had a jaundiced baby 1 gave birth to a child with gross hydrops, and the third had a stillbirth. Two of the women had a hemor thage some weeks before delivery and both had stillbirths. In all but 1 of the cases there was an association between (1) the time between delivery and bleeding, (2) the severity of the crythroblastosis and (3) the titer of the agglutining This suggests possibly the advisability of an early induction of labor when agglutinus are present in the mother in order (1) to prevent hemorrhage in the mother or (2) to prevent crythroblastosis in the infant, but this must be balanced against the risk of prematurity

The importance of the Rh testing of mothers is stressed especially because Rh negative mothers are prone to have hemorrhages on account of their isolmmunization and run the risk of incompatible

transfusions.

In explaining the disproportionately low incidence of erythroblastosis in the offspring of even Rh negative women authorities are quoted as stating that (1) many marriages are childless of produce only 1 child (2) there is a variable potency of the Rh anticen in the infant which produces agglutining in the maternal blood (4) there is a variable ability of the placenta to prevent the passage of the antigen (4) there is variable maternal response to the introduction of the Rh antigen into the blood stream and (4) there is a variable ability of the placents to prevent the passage of the agglutinins.

Parter B Crear, M.D.

Soloway II M : Control of Syphilis in Presnant Women J Am M Att 1045, 120 500

The Illinois Department of Public Health has re ported the results of its plan for the prevention of

congenital syphilis.

The plan calls for a blood specimen from every pregnant woman to be sent to an approved labora tory for scrologic examination. The report is sent to a central agency which contacts the family physician Information in regard to treatment as well as the necessary drugs are provided if so desired. In a klition, every facility to assure adequate treatment. and follow-up is provided f r the physician.

Adequate information was available in 1.448 cases. In the remaining 213 it was considered inadequate

for a variety of reasons.

The most significant finding was the relationship of the outcome to the onset of treatment. When treatment was started before the end of the fourth month the t-tal fetal loss was 6 per cent. Treatment delayed until the fifth month yielded a fetal loss of 17 per cent. Beyond that time the fetal lon rescied 40 per cent and in the absence of treatment a increased to 73 per cent

Reactions to antisyphilitic treatment seemed b-There were no fatalities, although n significant

serious reactions were reported.

This report stresses the well known fact that ongenital syphilis can be prevented by early discour and adequate treatment. In prevention of consensal syphilis the emphasis should be placed on early or tection. This can be accomplished if the patient are educated to seek early prenatal care and if the physician does a routine serologic test. Once the disease is diagnosed every effort must be sade to carry out adequate treatment and follow-up stades on both the mother and child.

JAMES F DOWNELT MD

Hudson G S. and Rucker M P Spontaneous Abortlon J (m 11 Am 945 29 542.

Statistics on the frequency of spontaneous shot tion vary widely This study covers 1,000 counts tive obstetrical cases in which there were too shortions of all types. When the 12 therapeutic and 2 criminal abortions were subtracted there resumed 04 spontaneous abortions, an incidence of 94 per cent.

The incidence was then noted in relation to certain factors and compared to the anticipated incident

of apontaneous abortion.

In patients who had had previous children or abor tions, the incidence was higher An increase a noted also in obesity, pelvic inflammatory dress, retrodisplacement, fibroids, hypothyroidism, da betes, in women who used tobacco and in most who gave a history of previous sterility. The hy crease was particularly prominent in the last for mentioned instances.

Factors which the authors stated had no effect es the incidence were the marital status, syphilis scatt upper respiratory infections, and falls.

JAMES F DOWNELLY M.D.

# LABOR AND ITS COMPLICATIONS

Mandel, H. S., Graff S. and Graff A. M.: Places tal Senescence and the Onset of Labor 4s. Old 1945 50 47

Estimation of the nucleocytoplasmic ratio reveals that the placenta ages in a uniform and continues manner from approximately 86 per cent at 1 months to 3 6 per cent at term The growth of the placenta conforms to theoretical and statistical beof growth. The toxemias of pregnancy has e se effect upon the placental age as measured by the nucleocytoplasmic ratio Death f the fetes in atero lowers this ratio i.e., causes increased aging, proably by some aut lytic process.

There is no correlation between placental searcence and the onset of labor

EDWARD L. COR CL. H.J.

#### PUERPERIUM AND ITS COMPLICATIONS

Fulton A.A.: Vitamin Cand Lactational Mastitis. Bril. II J 1945 # 488

Of a Scottish clinics for pregnant women designated by the author as clinic A and clinic B respectively each served about half of the town, and there was no distinction among the patients received as to social status or other condition. The group of patients attending clinic A who received ascorbic scid is referred to as group B and consisted of 114 women. The patients attending clinic B did not receive ascorbic axid being the controls this group is referred to as group B and consisted of 126 women.

In group A each expectant mother was given so mem, tablets of ascorbic acid daily at about a months before the onset of labor and until about 6 months following childbirth. On admission to the Maternity Hospital all of the patients in both groups were given the saturation test for vitamin C as devised by Harris and Abbasy (Brit M. J. 1037) 2 1429) The patients in group 4 required an average of only 1 673 mgm and those in group B 3 076 mgm. for saturation yet approximately the same percentage (25%) developed mastitus although the former were more favorably situated as regards the two factors considered to be predisposing causes of mastitis in lactating women primiparity (in from 47 6 to 52.4%) and delivery in the hospital (15 women of group A were delivered at home)

From these results it would appear that vitamin C administration per se has no influence in reducing

the incidence of mastitis

The subsequent tests on the patients with mastitis after the saturated state had presumably subsided from the first saturation tests (in about 3 weeks) showed that (as in the first test) on the average of 1,470 mgm. of ascorbic acid were required to saturate the patients of group A and 3 117 mgm were required to saturate the patients of group B. The saturation test according to the standard of the League of Nations showed that 63 7 per cent of the cases of group A reached the saturation stage within

2 days of the beginning of the test period whereas all of those in group B reached this state but at a much later date

2 I

The patients in group B were even in a somewhat better condition with regard to the severity of the mastitis because the process subsided without suppuration in 9 of the women in group B but in only 3

of those in group A

The author admits however that there are a number of vitating factors at work in this study, the most important being perhaps the fact that no account was taken of the possible effects of other food deficiencies in these patients and also the fact that the vitamin C administered was swithetic whereas it is possible that the maximum benefit may be obtained only when it is given in the form of natural foods.

### NEWBORN

Gamble, T. O. Miller L. C., and Tainter M. L.: Benzyl Penicillin; Clinical Toxicity and Efficacy by Mouth in Impetigo in the Newborn Infant. Am J. Obst. 1945, 50, 514

The benzyl ester of penicillin given by mouth quickly cleared 16 attacks of impetigo contagiosa in 15 miants in a maternity hospital and terminated a

protracted epidemic.

This new form of penicilin as stable at room tem perature and can be supplied to the physican readfor use. It is as effective by mouth in impetigo as is the sodium penicilin administered by infection. The great advantage of being able to give bens; I pencillin orally marks a major advance over the previous injection, therapy in managing this difficult condition. The new therapy avoids staining the skin and linen as in the treatment with dyes and also does not require the painful surgical removal of crust as in the local therapy of impetuso.

The effectiveness of benzyl penicillin demonstrated in this study points out the need for extensive tests of this preparation in other types of infection.

EDWARD L. CORNELL, M D

### GENITOURINARY SURGERY

### ADDENAL KIDNEY AND HERTED

Huff, F. M., and Boder, W. P., Jr.; Renal Hypoplace with Hydroureter and Primary Amenor rhea. J West Balt., 1045 ta.

The frequent coincidence of genital and upper urinary tract anomalies has been noted, and reports of many cases have emphasized this combination of abnormalities

The case here presented is of interest by reason of left renal hypoplasia, a greatly dilated and tortuous ureter with a stricture of its intramural portion aberrant vessels crossing the lower preter and promary amenorrhea, assumed to be due to consenitally defective internal genitalia

While renal hypoplasia is not uncommon, the great preteral dilatation found with it in this instance is unusual. The futility of endocrine therany in this case strongly suggested an end organ structurally incapable of remonse. From this experience it would appear that the complaint of primary amenorrhea justifies investigation of the urinary tract. IONN E. KIRKPATERTE, M.D.

Newman H. R.: Renal Disease in AAF Regional Station Hospital, J. Urel. Bult., oas to 156.

The incidence of renal disease is considered to be at the lowest figure during the draft age of from 8 to 18 years.

The present study includes 1 2 cases of renal lexions in patients between the ares of 18 and 18 years. This study reveals the large number of cases of renal disease which may be encountered in an average sized station hospital (approximately 500 beds) over a period of 12 months. In this period of time there were approximately 475 urological admissions, and about 1,200 patients were seen as out patients. Patients with venereal disease were not included on this service

The renal lesions most often encountered were congenital anomalies, infections, and calculi on the other hand penhroptosis, albuminuria, hematuria of unknown origin, nephritis, and tuberculous were found to be relatively uncommon.

TORY E. KIRKPATRICK, M.D.

Neebit, R. M. Keitzer, W. A., and Lynn, J. M.; The Prognosis of Renal Tuberculosis Treated by Nephrectomy and the Outlook of the Pa tient Who is Considered Unsultable for Opera tive Treatment. J Urel. Balt. 1945, 54

Data are presented on 260 cases of genitourinary tuberculosis which have been followed for a period of s years or more. It is pointed out that in this series males were affected more frequently than females, in a ratio of about a to I and that the urine in about one-third of the cases was secondarily injected by organisms other than the tubercle bacillus. Fifty and three tenths per cent of the penhaertoment natients are living an average of 11 years after men tion, while 81 3 per cent of the patients not operated upon have died in an average of 3 years. The author were unable to demonstrate that an accommendar cenital complication in the male adds to the mor tality of renal tuberculosis and they assume that the higher death rate among males is due to the higher mortality of tuberculous generally in this pertuche emon n

Three facts derived from these figures have novel

to be statistically significant In nephrectomized patients, a lower rate of survival is found in the group in which acid iss bacilli have been demonstrated in the prine from the kidney not operated upon, by suines of fromk tion than in those with normal urine on the sound

2 In tuberculosis of the urinary tract the survival of females is greater than that of males

The mortality rate of genitourinary tubercalors is adversely infinenced by the presence of bone and TORDY A. LONDY M.D.

foint, or pulmonary lesions.

Dourmankin, R. L.: Cystoscopic Treatment of Stones in the Urster with Special Reference to Large Calcuil, Based on the Study of 1,59 Cases. J. Urel. Balt. 945, 54 245.

The author presents a series of 1,550 cases of ur-teral calculi, situated at all levels of the ureter and renal pelvis, and lists the results obtained by cysts-

scoole manipulation in 1 253 cases. The methods of nonoperative treatment of anteral stones are classified and evaluated by the author es follows

Industiling ureteral catheter This does not produce dilatation of the ureter adequate enough for the passage of large calcull. It is of distinct value, combact with the administration of sulfa drugs, in cases is which renal infection is a complication of prinary blockage, and should be utilized in these cases prior to attempts to dilate the ureter with rubber bap and metallic dilators.

Methods for forcible removal of sectoral calcul-These include the use of metallic books, calcul, and baskets and are condemned for general use, as they are dangerous in both theory and practice, resulting in serious damage to the ureter in many instances.

Dulatation of the wreter This is done at or below the level of the calculus to a degree adequate to allow passage of the stone. It was the method of choice in the management of ureteral calcul in this series of cases.

For the purpose of determining the results of intraureteral manipulation, the stones were divided into two large groups A, small calculi, measuring less than 5 mm in width, and B large calculi, mesturing 5 mm. or more in width.

There were 780 cases in group 1. Tabulation of the results shows that excluding 48 cases of spontaneous passage of stone 41 cases which were lost to observation and 2 cases in which no cystoscopic manipulation was attempted because of the severity of the renal infection and in which nephrectomy was done, there were only 2 of 689 cases treated in which the cystoscopic manipulation failed or that a successful passage of stone followed cystoscopic intervention in 99 7 per cent of these cases. Six cases of complete anula were observed in this group 4 cases showing billateral calculous obstruction and 2 showing smutas of apparently reflex organ.

There were 71 cases in group B There was spon taneous passage of the stone in 10 cases and 24 cases were lost to observation. Intraureteral manipulation was successful in 484 cases or 85 9 per cent. The principle of providing ample room for the downward passage of the stone at and below its level was followed in this work. This was achieved by dilatation of the lower end of the ureter with the author's metallic bougies, and by unlar rubber bags at the higher levels. There were no instances of ruptured ureter or mortality resulting from instrumentation Operative removal after cystoscopic manipulations had failed was necessary in 80 cases or 141 per cent

In 134 cases of group B operation was performed without a preliminary attempt at cyatoscopic ma nipulation for one of the following reasons the stone being obviously too large, acute infection, advanced chronic infection and hydronephrosis an emergency (hemorrhage, impending uremas, or ruptured kid ney) a large renal calculus requiring operation associated with a stone in the upper ureter on the same side renal destruction on the opposite side due to a renal calculus associated with a sintly large stone in the lower end of the ureter bad impaction, an analyment of the uniformed incident under stricture empyems of the ureter following nephrectomy the association of stone with renal tuberculosus or the patient's refusal of cystoscopic treatments.

WILLIAM W SCOTT M.D

### Lazarus, J. A., and Marks, M. S.; Primary Carcinoma of the Ureter with Special Reference to Hydronephrosis. J. Ursl., Balt., 1945. 54, 140.

In 1914, after a careful search of the laterature one of the authors was able to collect 68 cases of primary carcanoma of the ureter, including 3 of his own Since then 115 additional cases have been reported, which indicates an increased alertness on the part of urologists to the possibility of this disease rather than an actual increase in incidence.

Of the total number of tumors 4s per cent were of the nonpapillary type. Malignant neoplasms were situated in the lower segment of the ureter in approx imately 50 per cent of the reported cases, and were associated with ectasis of the renal pelvis in 464 per cent and of the ureter in 43 7 per cent because of the tendency of these tumors to occlude the lumen of the ureter. The greatest prevalence of this disease oc curred in the sixth and seventh decades Ureteral carcinomas show marked invasive and metastasizing tendencies particularly to the regional lymph nodes (28 9 per cent) liver (14 9 per cent) and bones (12.8 per cent)

Although pain hematuras and the presence of an enlarged kidney are supposed to constitute the char acteristic triad of symptoms of this disease, it was found that hematura alone was by far the out standing symptom, having occurred in 70 5 per cent of the collected cases. A clear cut and persistent filling defect in the urterogram especially when associated with ectasus of the segment of the urter duretly above such a defect in the suthors opinion, constitutes the only pathognomonic sign of ureteral tumor

The chances of demonstrating filling defects in unterograms would be enhanced if repeated attempts were made to obtain good ureterograms in all cases which (1) disclose an obstruction in the ureter, (2) bleed through the ureteral exthete as a result of manipulation at the site of the obstruction, and (3) fall to disclose a calculus at the site of the obstruction Failure to recognize the presence of this discase has led urologists to remove hydronephrotic kidneys only to learn later to their great chagrin that the hematura had recurred and necessitated a second operation for the removal of the tumor bear ing segment of ureter

The procedure of choice in the treatment of this disease is complete extraperitoneal nephrourierer tomy. It is recommended that a cuff of vesical wall surrounding the ureteral meatus also be removed in cases in which the tumor is situated low down in the ureter and especially when the ureteral meatus is involved.

A careful review of the literature has further strengthened the authors belief in the dangers of incomplete urological surveys for so-called minor urological complaints and a detailed history is given of a case in which the patient was perfunctorily treated on and off for 15 years for cystins without being subjected to a thorough urological survey. It is believed that the lesion which was found could never have progressed to such large proportions had ureteral catheters been passed during one of the episodes of so-called cystifis.

JOHN E. KIRRPATRICK M D

### BLADDER, URETHRA, AND PENIS

Lawia, L. G: The Treatment of Bladder Dysfunc tion after Neurological Trauma J Ural Ball 1945 54 284

The author reviews the anatomy and innervation of the bladder and the physiology of micturition He believes that the increase in bladder tone following preserval neurectomy is due to increased vascularity of the bladder wall.

The following principles are outlined for the urological care of patients following spinal injury

I No instrumentation for 24 hours

2 Absolute a septic catheterization at 24 hours if necessary
3 The use f a prethral retution catheter if a

The use of intermittent or tidal irrigation of

second catheterization is necessary

- the bladder with acid solutions to prevent incrustation cystitis
  5 Permeal arctirostomy in selected cases
  6. The use of a well placed appropriate takes
- 6 The use of a well placed suprapubic tube when definitely indicated for long or permanent bladder drainage This is indicated in complete transverse lesions below L-I Six weeks is about the limit of tol

erance of the urethra to catheter drainage.

Close co-operation between the neurosurgeon and
the urologist is required in the care of patients following severe cerebrospinal injury

WILLIAM W SCOTT M D

### GENITAL ORGANS

MacLeod D: The Glandular Nodule in Benkin Glandular Enlargement of the Prostate; Ita Development and Cause Bru J. Urel. 945 7

os no benign glandular enlargement of the glandular nodule in benign glandular enlargement of the prostate is as

I At any one time during the growth of the prostate there are present groups of tubules at times unrecognizable which arise from the terminations of the primary and subsidiary tubules of the prostate. They may be collective as in the prespermatic region, or individual.

2. With further increase of the glandular tissue in general, a circumscribed resistance to the growing groups is created in due course by the tissues in which they are situated. It is caused indured by by a passive force applied to the tissues from the periphery of the prostate as a whole and also from that of the prespermatic region.

a Growth of the groups against that resisting tissue is accompanied by and causes the formation of, circumscribed capsules of fibrus and/or compressed glandular tissue about them the groups are thus isolated and so form the glandular nodules associated with the benign enlargement of the prostate

4. Within the limiting capsules growth of the groups may continue actnous formation and intra actnous epithelist proliferation are followed by acin-

ous dilatation and rupture.

The direct cause of benign glandular enlargement of the prostate is continuity of the active glandular growth against a passive and circumscribed resist ance derived from the periphery of the prostate as a whole and also from that of the prespermance region.

The glandular module in the benign enlarged prostate is evidence f an attempt to limit the size

of the gland

Peripheral resistance to the glandular growth be comes duly effective in the upper parts of the pros-

tate first and it the lower parts last, because of the last portionate increase if growth in the talk goods and glan lular nodules are in point of time and place likewise formed.

The absence of benign enlargement from the uper part of the posterior lobe of the prostate is due to the destruction of its groups of tubules by pressure from the enlarging lobes in front of it absence from the lower part is caused by lack of adequate periphent resustance to its growing groups of thobles.

Bengen glandular enlargement of the termul parts of the lateral lobes of the prostate is equally as rare as the same condition in the posterior lobe and is due to lack of adequate peripheral resistance to the growth of the tubules in those parts.

Joseph L. Lory M.D.

### MISCRILANEOUS

Yamauchi, 8.: Chyluria; Clinical, Laboratory and Statistical Study of 45 Personal Cases 06served in Hawaii J. Ural. Balt., 1945-34-34.

The clinical, laboratory and pyelographic stedisbased on 45 personal cases of chyluria are carefully compared and correlated with those if the case recorded in the literature and a comprehensive jicture of chyluria is here presented.

The etiology and pathology have been discreted, chiefly on the basis of the author's experiences with his own material, hence they represent his own years. This material has been added as an adjust to the main material and the analysis of the records, to aid the reader in obtaining a comprehensive pic

ture of the disease. The individuals suffering from chyluria had all been exposed to filariae during their lifetime, but filariae were never demonstrated in their blood urine or as in some cases, tissues. The long pened from the last possible exposure to the filarae t the onset of chylurfa (in many of these cases) the absence of cosinophilia (in the majority) and several other factors indicate that filariass probably predisposes the patient to this condition but it does not actually initiate it. However anyone who has been exposed to this nematode becomes a potential canddate for chyluria anytime, even many years after the exposure Thus, the incidence of this disease can be expected to rise in regions where filariasis is not prevalent, such as the northern United States

armed forces return from regions where it is endema.

Cause of chyluria. Formix replure caused the carting cause of chyluria. Formix replure caused the carting stasis results in a lymphaticouring communication, and chyle appears in the voided write if the ruptured lymphatic vessels alresdy omnian chile. Except in a few instances minimal pathologic changes sufficient to from varied danier obtrieved in the lymphatics without criminal pathologic changes sufficient to from varied danier obtrieved in the large retroperitioneal imphatic vessels and thoracted duct. Preparancy endocrackit and prostatic hypertrophy so frequently found uit thus condition become logical concomitant occur.

rences instead of bizarre associations when viewed in this light

Chyluna is characterized by the appearance of chyle per se in the voided urine. The presence of fat granules in a colloidal state the presence of albumin crythrocytes and lymphocytes the pyelographic injection of the renal and perirenal lymphatics fre quently associated with forms rupture and pyelovenous reflux and the control of the condition by repeated intrapelvic lavages with sclerosing solutions support the surmise that there is a lymphatico unmary fistula at the forms of the calves

The control of chyluna can be accomplished without much difficulty by repeated intrapelvic lavages of silver nitrate solutions through inlaid catheters but the cause of urinary stass must be removed and fat must be eliminated from the diet after such lavages. The success of such management depends on the extent to which the predisposing and crotting causes can be eliminated.

JOHR A. LOET M D

Solomon, S.: The Treatment of Gonococcal Arthritis with Sulfonamides and Artificially Induced Fever. Am J. Syph., 1945. 29, 567

Twenty three cases of drug resistant gonococcal arthritis are reported. Of these to were treated with sulfonamides and artificial lever in the hyper therm with the following results 4 were cured and the remainder showed either considerable or partial improvement. Fifteen were treated with sulfonamides and fever artificially induced with intra-enous typhoid vaccine with the following results 6 were cured 6 were either considerably or partially improved 3 were not improved and 2 of the last group were subsequently treated in the hypertherm with good results.

The results with both of these methods were encouraging. The use of the hypertherm is preferable to the use of vaccine. The most important conaderation however is early treatment. Hence if the hypertherm is not available combined vaccine and sulfonamide therapy should be instituted without delay. It is emphasized that specific therapy does not supplied the regular methods of management of arthritis, which include bed rest, special diet and physiotherapy. Specific therapy is used in addition to those and results in a much greater percentage of cures and in the restoration of joints to useful fine from Joint A. Lorr M.D.

Koch R A Haines, J S., and Hollingsworth W Y: Penicillin in Gonorrhea Treatment and Control J Am M Ass 1945 129 491

The authors results do not justify the behef that penicillin is an easy infallible cure for genorrhea Penicillin will cure most cases of genorrhea but cure is not necessarily accomplished by the first course of the drug or by penicillin alone Supportive treat ment, such as pyrotherapy and sulfonamides is necessary at times Penicillin failures are frequent enough to warrant diligent search for genococci following medication, for absence of clinical symptoms is not proof of cure.

Two groups of cases one under hospital conditions for 8 days and the other under clinic conditions for 9 weeks are compared. The minimum hospital criterion of cure was two negative consecutive cultures obtained by prostatic massage the last one being made at least of hours after completion of the medication and preceded by the provocative passage of sounds. The minimum clinic criterion was three consecutive negative cultures with one week between cultures. The taking of one follow up culture is not conclusive or adornate evidence of cure.

Fourteen per cent of 485 patients treated with an initial course of 200,000 units of pencillin were not cured. Patients with gonococcic epididymitis or prostatitis responded as well to pencillin therapy as those without such complications.

Penicillin is unquestionably the most valuable therapeutic agent thus far available for the treat ment of gonorrhea. The medical profession must be awate of the limitations of penicillin therapy the possibility of producing a carrier state and the social factors related to the spread of the disease.

DAVID ROSENBLOOM M D

# SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Bowden R. E. M: Muscle Changes in Denervation and Re-Innervation. Brit. M: J 945 1 487

The muscle changes in denervation and re-inner vation are considered from the point of view of histology electrical reactions electromyography and

the treatment of paralyzed muscles.

In the matter of structural changes, in the early stages (1 to 3 months after denervation) there is a loosening of the compact arrangement of the muscles and an apparent numerical increase of the nuclei there is some stasis of the blood the nerve fibers undergo. Wallerlan dependance on the empty Schwann tubes and empty motor end plates remain. After 3 months the muscle fibers atrophy and are replaced eventually by fat and connective tissue ghosts of muscle fibers a few capillanes, and the larger nerve trunks may be seen surrounded by fibrus tissue a few scattered connective tissue tubes containing granules may be all that remain of the muscle fibers. However the changes are Dre

dominantly those of atrophy and not of degenera

tion, and up to one year after denervation it is

possible to expect a fairly good degree of functional

recovery from then on the prognosis deteriorates.

and as a rule after a years the prospects are exceed

ingly poor There are, however notable individual variations arepsis, age, mobility of the limb and physical therapy influence the rapidity of the changes. With repart to the electrical reactions, Erb's reaction of degeneration develops, faradic stimulation is lost and the threshold to galvanic stimulation with loss of contractife substance and may finally disappear altogether if a trophy is advanced. The fallure

to elicit a galvanic response in the absence of edema indicates serious change in a muscle.

On the subject of electromyography the author

On the subject of electromyography the author notes that for about from twelve to twenty-elght days after denervation there is no recordable electrical activity in human muscle on attempted movement or at rest from twelve to twenty-elght days after denervation, however, fibrillation does occur thus is aboven by rhythmic, fine spikes on the tracing, which are totally unrelated to attempted voluntary contraction. Fibrillation persists as long as any contractile denervated fibers remain or until re-in nervation is akidne place.

Ferralic stimulation is useless the denervated muscle however responds to galvanism, and this therefore one method of treatment. Electrotherapy not only should be regular and adequate but should be join as soon as possible later injury. Physical therapy is also of value in the prevention of contextures in the paralyzed muscles daily movement throughout the whole range of the foliats of the limb should be carried out, and splinting of paralyzed

limbs is never done to obtain immobilization rales there is a fracture or an unhealed wound,

However whatever the treatment, the degree of functional recovery will depend on the nature of the lesion in the nerve When the tranms or lesion to the nerve has not been sufficient to intermed the supporting tissues of the nerve, although the transhas been sufficient to cause complete peripheral degeneration of the arous, good powerful independent muscle action may be restored but the pattern of innervation will be alightly abnormal. When how ever the nerve has been more seriously damaged there may be partial disruption of the Schware tubes and scar formation, then there will not be as even advance of reveneration arous and some or manent weakness and atrophy may be expected. Is complete division of the nerve no recovery on falls place without surviced intervention, which should be undertaken as soon as noesible. Even so some son there will result at the suture line, with unavoidable confirmion of the arons at this point, the number of nerve fibers reaching the end organs being thus diminished

Motor unit action potentials may precede rem-Motor unit action potentials may precede remtal observations in balated Instances, nevertheless to occur. Still, the finding of both fibrillation and motor unit action potentials indicates a partial or recovering degenerative lesion of the lower motor recovering

A good functional recovery is possible wills the electrical reactions are still abnormal.

JOHN W BRIDGAR, M.D.

Jackson, E. C. S., and Seddon, H. J.: Gairasher and Denervated Muscle Atrophy Brit. II J 1945, 485.

The results of electrical stimulation in the treat ment of lower motor neuron lessons in general war rant the formulation of certain conclusions

1 Muscle atrophy begins very soon after denervation and at first proceeds rapidly then it gradually slows down as the time after denervation

2 Interstitial fibrods is a constant feature of denerration atrophy and it follows that the great the atrophy and the fibrods the poorer the dimain functional recovery. It follows that if atrophy and be prevented or controlled there is a greater hishood that recovery will be satisfactory.

3 As yet there is no evidence that fibresis is irreversible. The treatment to prevent it should be started as soon as possible after deneration and continued until re-innervation has occurred.

4. The precise nature of denervation atrophy is still unknown. Disuss and a consequent impairment of nutrition undoubtedly play an important part.

Fibrillation has been regarded as an important factor in tiring out and causing atrophy of the de

5 It has been conclusively shown that muscle wasting can be controlled to a very considerable extent by repeated electrical stimulation with a stimulus of comparatively long duration Galvan sum has several disadvantages but it is the only type of stimulus of long duration generally available it was used in the investigation.

6 The treatment must be intensive both in the strength of the stimulus and in the number of con tractions at each session and it must be continued over a long period to be effective.

7 Galvaniam is of greater value in the prevention of wasting when it is applied early. It has been re ported that even the most intensive treatment did not altogether prevent atrophy

8. In the treated muscle the muscle fibers remain comparatively large. The interstitual tissue does not increase to any great extent and if reinnervation occurs, functional recovery is good. In untreated muscle the fibers shrink rapidly fibrous tursue appears between them, and recovery is poor

The rate of wasting in man after denervation is unknown. Adequate stimulation is limited by the large size of many muscles and other factors. This article describes the end results when 164 patients were examined in pr of whom it was possible to obtain readings with sufficient frequency to be of value Of these 54 were suffering from complete nerve lesions The results are based upon the find ings in these 54 cases Ulnar paralysis was present in every case in 18 per cent of those treated with galvanism and in 20 per cent of those not so treated there was also paralysis of the muscles of the hand supplied by the median nerve.

thalf of the cases were treated with galvanism and the other half without galvanism. Five charts are presented which show that in each period up to 400 days there was a steady loss of volume in the un treated muscles the rate of loss gradually diminish ing until after 400 days when there was little change Galvanism was not effective during the first 100 day period Galvanism was almost completely effective in preventing wasting at all other times. There is no doubt that the volume of the hand is better main tained when the retarded muscles receive regular galvanic stimulation.

The beneficial effect of galvanism is most notice able early rather than late after denervation. It follows that the earlier treatment is started the better the result. Galvanum at best prevents a de crease in the muscle volume. It follows that what ever has been lost from delay cannot be regained During the first 100 days, galvanism does not pre vent wasting it only retards it. Without galvaniam, wasting proceeds faster in the first 100 days than at any other time. It is never too soon to begin gal vanic stimulation. If the paralyzed part must be enclosed in plaster windows should be cut to permit carly application of electrodes to affected muscles

The cases in this study were treated six times a week. Recordings were also made in cases treated three times a week. In addition recordings were made when there was considerable variation in the technique The good results were in direct propor tion to the amount of treatment. Calvanism is of real value and success depends largely on the fre quency of treatment. The treatment consisted of the application of 90 stimuli per day for 6 days a week The stimuli were strong enough to produce a brak contraction They were given at the rate of 30 per minute with an interval of 1 minute between each group of stimuli to permit recovery from RICHARD J BENNETT JR. M D

Gootnick, L. T : Solitary Myeloma; Review of 61 Cases. Radiology 1945 45 385

The prognosis of solitary myeloma is much better than that of multiple myeloma. Judicious irradia tion produces relief of the symptoms and prolongs

Sixty-one cases in the literature are reviewed of this number 2 were the author's The average age of the patients was 50 years. The ratio of males to of the patients was 2 to 1 The ilium femur humerus and thoracic vertebrae were the most common sites in volved. The chief complaint was a localized pain gradually increasing in severity Pathological frac ture under increased stress and strain or trauma was frequent. A palpable mass was present at times Solitary myeloma did not produce a generalized weakness and anemia as seen in multiple myeloma Hyperproteinemia, renal damage, and low blood pressure were rare.

Roentgenologically there are two types of solitary mycioma. The first resembles, and is frequently interpreted as a giant cell tumor. The lesions are cystic and trabeculated within the medulia of the long bones or pelvis the cortex is expanded and pathological fractures are frequent. The accord type is characterized by bone destruction. The pathology in both types is plasma cell myeloma.

All types of therapy have been tried Fort; three cases were treated by irradiation following blopsy and curettage. As many fields as possible were used and the dose was fractionated from 700 to 500 r per portal for a total dose of from 1,000 to 3 000 r The course of therapy could be repeated whenever nec essary Relief from symptoms was obtained in all but 2 cases. In 29 cases recalcification was demon strable with x rays. Generalized spread occurred in

In this series 27 patients survived and 16 died. Of 15 who died (1 died of a cardiac lesion) all but 1 lived more than 21/4 years from the onset of the symptoms. The average duration from the onset of symptoms was 7 years, and the lapse of time from hospital admission to death was 3 years and 9 months for the solitary myelomas in contrast to 14 months for the multiple myelomas.

Most authors believe that the duration of life is dependent on the transition of the lesion from the schitary to the multiple type f my l ma. Solitary lesions tend to be being and edit for years whereas multiple lesions are malignant. Markies D. Salis, M.D.

Koch S. L.: Injuries of the Hand. Q Bull Verthrest Unro M School 1945 0 265.

Simple principles of treatment of hand injuries, early and late are concisely reviewed and pointedly illustrated

Immediate cleansing of the area surrounding the wound, then of the wound itself, with some water.

wound, then of the wound itself, with soap, water and salme solution prepares a clean field where restraint in débindement is essential. Only if the wound can be closed for primary healing (by skin graft or pedunculated flap if necessary) can deep structures safely be repaired. Fractures may be reduced, but no nerve or tendon suture abould be done without assurance of wound healing by primary auton. Concerning local chemotherapy with sulfonamides the author quotes Meleney's report and War Depart ment Directives which indicate that extensive clinical trail has proved its ineffectiveness.

Satisfactory late repair of compound injuries rests on three basic requisites which must be faithfully ful filled in spit of all pressure on the argent for speciaction (1) superficial a d deep tusses must be free of infection (2) all inflammatory reaction and aduration must be gone from the affected area and (3) the general condition of the patient must be optimum for prompt healing of extensive served wounds. The period of walting for these condition to be realized is important and should be utilized to bring all factors in the final effort to an optimus The normal status of the circulation, free joint motion and good muscle tone are emental to a satisfactory end result and all are stimulated by active motion in a warm water bath. Spirits are needed to support paralyzed muscles and prevent stretching and can also be used with gentle traction to overcome contractures already present.

A normal soft thance covering for the injured pain must be prepared to replace this near which is a self-causes contractures and cannot be used to over deep structure repairs. Combined nerve and tendinglary is frequent and repair should be undertake as a single project to conserve tissue and time. Cur rent literature on this subject is cited.

Essentials for success in this type of surgery are that the wound heals by primary union a minimum



Fig. Ventitator fan injury of the right hand. The therax and bypotherax mades were severely lacerated, the nettearpopolategoral joint of the thomb as laid open, and the ulnar nerve and blood venuchs are avulsed with flap. The loder and middle fingers are sulmost completely valued at the premisal Inter palalargeal joints. Immediat cleansing, carising of the ragged and tom these reair of the joint capsale of the thumb, sturne of the ulnar nerver, and choure of wound without drainage were done. Left, Immediately after injury Right, tiprinary dressing, 6 days later.

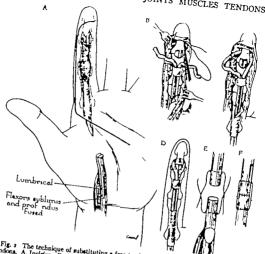


Fig. 2 The technique of substituting a free tendon graft for hopelessly injured flexor tendons. A Incision. B After the fibroped dexor tendon have been existed, free grafts are drawn through the carefully preserved tendon sheath and a suide sature is carried around the distal phalant through a bust witned made with a shapered ancurpen around the distal phalant through a the most bust and the statement of the two tendons are smoothly united the two grafts are drawn tant, by tension on the tendon first drawn through the united, and the line atture comes to the the midding on the dorsam of the distal phalant. D Fine silk entered the tendon graft and the stump of the production help to make the attachment of the profundation of the provincial segment of the flexor profundus. Incision in the finger is closed one suture of the graft to the profundus is carried out.

of inflammatory reaction to surgery is incurred and that the postoperative wound be kept at rest so that sutured nerves and tendons are relaxed until firm union has taken place

Increase may be planned to include excision of an old scar and thus avoid multiple scarring. Cosure over repaired nerves and tendons must be made by names of a reflected fland tendons must be made by the state of the state of the scar and subcut account state. Continuity remains uninterrupted over the deep suttent of the state over the deep suttent of the state of the scar and tendons only with account customer of the scar and tendons only with a proved to initiate scarring and adhesions and thereby nhibbit free gliding on which normal function depends.

Tendon grafts are useful to bridge separations particularly of severed fector tendons within the digital sheaths and may be taken from the long extensions of the foot uninjured portions of the flexor

sublimis or the paimans longus. Problems arising in the use of tendon grafts are discussed and the technique used is described and illustrated

It is best to remove the distal fragment of the flexor profundus and fix the graft directly to the phalanx. To facilitate freedom of movement, the graft is carefully discerding discounting the same companying thin layer of arcolar tissuch an accompanying thin layer of arcolar tissuch an adequate incision is used to avoid traumatizing the graft in securing it which reduces the fibrous reaction and subsequent scarring.

The tendon is held in place on the palmar surface of the finger by a part of the digital fibrous sheath or by a new annular ligament made from a free slip of tendon. The degree of tendon at which the graft cult to describe but it should be suffigurent is did of the normal physiological state this may be obtained by attaching the graft snugly when the wrist

and fingers are maintained in the fleved position. Postoperative immobilization must support the tissues with a minimum of tension at the sature line until firm healing occurs, usually in from three to four weeks. Too early attempts at motion pro-

oke additional inflammatory reaction therefore gentle active motion is withheld for from two and one half to three weeks. Paralyzed musicas need continued protection against stretching until nerve regeneration is complete in order that the integrity of their function is maintained.

FRANCIS E. BREMUTCER, M.D.

Platt, A. D: Post Traumatic Para Articular Calcifications and Ossifications of the Ankle. Ass. J. Reest. 045-54-545.

Post traumatic calcification of a foint is important and frequently encountered in military personnel. Although calcification of most joints has been described little or no mention has been made of it in the ankle foint.

The etiology and chemistry of para-articular calcifications as well as anatomy of the askle joint are discussed. In most instances, trauma is the predis posing factor. Immediate reentgen films may reveal only a soft tissue swelling. Serial roentgenograms serve to explain and sid in making a final diag noise. Within 30 of a weeks following the initial in jury linear calcification may be seen parallel to the posterior is post first the anterior superior talus, or lateral malleolus. Calcification may be seen also in the interactions us space. There are two types of calcification evolutive, which appears fursy and has hazy margins with varying degrees of opacity in the adjacent connective tissues and stabilized which is a mature contracted, well defined density

Treatment is conservative immobilization and physical therapy. Sedation may be employed for pain. In the military services, it is wise to excuss these patients from marching and give them office positions. In severe instances anesthetic injections have been used with good results. Radiation therapy also has been used with storonible results. In most cases, full function of the antile in ever restored, and calcification may penaliz and be followed by fusion. Although there have been reports of cases of spon taneous regression of calcifum, they are very rare.

MAURICE D SACRE M.D.

Horn, G. E.: Acute Ischemia of the Anterior Tibial Muscle and the Long Extensor Muscles of the Toes. J Bens Surg. 1945, 27, 615

The author presents 2 case reports describing a peculiar type of vascular disturbance, a localized ischemia of the anterior tibial muscle and the long extensor muscles of the toes.

extensor muscles of the toes.

The characteristic clinical symptoms and findings are sudden onset of severe pain in the anternor portion of the leg rapid development of swelling over the anterior fascial compartment, mild to intense evithema and glossiness and slight to complete perponel herve involvement.

The hist logical changes are identical to those occurring in Volkmann's ischemia. The vaculm change is a forests of the media, adventitia, and the periarterial tissue of the anterior tibial artery and ensuing occlusion

The pathogenesis is obscure, but may be explained by repeated overwhelming physiological demoke upon the anterior tibual artery for cample, dury military drill. Because of the anatomical array ment, the musculature of the anterior fascial one partment is particularly vulnerable to circularly disturbances. Idiopathic clawfoot may knew the origin is unsufficiency of the anterior tibul array

with fachemic contracture.

The treatment consists of early block of the labor sympathetic ganglis and early complete verial incusion of the anterior facial cruis. Arteretory advocated by Lenche, should be performed if piletion does not return in the anterior tibkil artery fix authors state that Lenche believes that the skill crated artery becomes a diseased sympathetic serv, inducing vasoconstriction in the collected network. He has demonstrated the increase in the collection circulation following resceint on the diseased story

DANTEL H. LEVINIBAL, M.D.

### SURGERY OF THE BONES, JOINTA, MUSCLES, TENDONS, ETC.

Johnson, R. W., Jr., and Lyford, J., III. The Yest ment of Benign Glant Cell Tumor in the Less Third of the Fenur by Curettess and "Ickscoping" the Fragments of Bone. J. Bone Sep. 945, 37, 557

In 1016 a patient suffered from a giant cell trust of the femur and had an operation in skick er fragment of the femur was telescoped over the alth fragment. The original operation next with persa neat success and since that time the author save employed this procedure in a series of 5 aimster CASCA.

Case I White female, age 23 in whom this procedure was carried out. The final shortening was 16 inch

Case 2 White female, 58 years of age, with a fmi

shortening of 1 inch.

Case 3 White female age 22 with a final short

ening of 3 inches.

Case 4. Colored woman, 38 years of age with 8

final shortening of 11/2 inches.

Case 5 White woman 25 years of age, in whom

the final shortening was not noted.

The operative procedure consists of exposing the involved area of bone in the distal femurand critical femurand critical femurand critical femurand critical femurand critical femurand critical femurand from the first femurand femurand from the first femurand from the first femurand from the first femurand from the first femurand femurand from the first femurand from the first femurand f

involved area of bone in the distal feront and cutting a window in the thinnest part of the cutter. The tumor is removed by curretage. The carty a cauterised with pure phenol and washed out an alcohol. The remaining cortex is divided and the distal fragment is forced up around the end of the shart of the bone by telescoping the fragments and the cutter of the control of the cont

into metaoo permus removal of the tumor in the state in which the articular carrilages of the knee cases in wincer time activities; cartingers or the ancepoint are intact. Good faults were obtained in all RIGHARD J BENNETT JR M D

# PRACTURES AND DISLOCATIONS

Ancill A. P. Traumatic Dissesses of the Symposium Annual A telli A. P.; Traumette Dississis of the symphysis Publis by Muscle Action (Dispusacion Laumitica de la singlis polica por acción moscular) traumática de la aminate poince por accion Sol tres soc cirag Cardosa 1945 6 136 Distant of the puble bone involves in any of the

Displays of the public cone involves inducy of the according fount. When the separation is not more sacroniac fount. When the separation is not more than 30 mm, there is only injution of the anterior can 30 mm, there is only suprime of the anterior state of the sacrollace joint when the separation againent of the sacrotuse point when the separation is between 40 and 80 mm, there is fotal rupture of to between 40 and 80 mm, there is total rupture of the antenor and posterior ligaments. Four kinds of possible displacement in displacement in displacement in displacement in displacement in the state of

Court and of Positive displacement in displaces of the public symploxis are described—vertical income and the public symploxis are described—vertical income and the public symplomes. the public symphysis are described - vertical uses were sacistal and mixed Pure traumatic dusts verse, sagittar and mixed trum traumatic death a conference of the public symphysis is rare. Among 13 500 to the public symphysis is rare. Among 13 500 to the public symphysis is rare. is of the Public symphysis is rare. Among 13 500 pelyis and 10 of dissense 73 of fracture of the fracture of the Such Cases of dissense are generally without The muscles that provides that provides that provides that provides the control of the public without the muscles are the control of the public without the muscles are the control of the muscles that produce the control of the public provides that produce the control of the public provides the control of th nacture. Such cases of distants are concruing the musical that produce

Cannon by musice action. The musices that produce the distant are those of the internal region of the the unstant are those of the internal region of the high with the leg fixed in hyperestension and hyperabduction Preasoutton.
The cluical diagnosis may be suspected in cases

with violent contusions may be suspected in cases with violent contusions especially of the pelvis associated with servous traumatic short the pelvis and the pelvis associated with servous traumatic short the pelvis associated with servous traumatic shorts. lamps of the symphysis and acrollic spoce and signs of actions or the symposyme and exercisive points. Miles the district in Otto of the Conference of the Co descent of the injured side the rooms on the shows an account of the injured side. descent of the injured side the roentgenor supported state the normal side supported states of the normal side supported states of the supported state Source an apparent ascent of the normal side the sound of the normal side that is found to the sound of the s spinespoor measurement is important, that is some solutions of the public to the anterouperor line. the strate of the public to the antenwaperor made points. This measurement is small on the unique and a state of the strategic of the strategi spines, this measurement is small on the uninjured side while on the injured side it increases with the Surgical treatment is Parely indicated as ortho-

Outside treatment is farely indicated as ortho-polic treatment generally gives very good results. Two cases are described, the first was of the de-Awo cases are generated in one was or the use should retain the which the rooms constraint the same and the s scending variety in which the toengroup sample of the normal side. Con Moreu apparent ascent on the normal fine. Con timous vertical fraction was applied to be a stronger on the normal side. This does not have a stronger on the normal side. This does not not to the stronger of but stronger on the normal side. This does not satisfy this side down but with the feet pressing pressure on the other side and pushes the descended unward. In the second case instead of conpressure on the other side and purious the descriptions while prayed in the second case instead of conand upward in the second case instead of con-tinuous contralateral pressure the head of the bed was released the last to flavoral and the whole loop bed was called the left log flexed and the right log of the left log flexed and the right log of the last log flexed and the right log of the last log flexed and the right log of the last log flexed as it slid down the the influence and resided against a place at the root to the bod The weight of the body as it and down the root and the bod acted on the Posterior part ordined plane of the bed acted on the posterior part of the occur and pushed the duplated bone sprard While a satematical while a satematical terms of the occur and the satematical satem of the coccyt and pushed the displaced body upward South of the cases are illustrated. While anatomical contraction managements the functional results away of the Cases are illustrated by the characteristics and the functional results are not complete the functional results arms with Moscow M.D. Moscow M.D.

ADDREY G MOROTH WD

Collom, S. A., Jr.: A Comparative Study of 100
Concerns of the Shaft of the Femus In Wilch
Concerns the Study of 100
Conce Fracture of the Shert of the seman in water of the seman in water

The author presents 100 consecutive cases of femoral fractures observed in a general hospital in icuncat fractures observed in a seneral dospitat in Lady. Uninterrupted treatment was rendered until tray Uninterrupted treatment was rendered until
the patients were evacuated to the United States for the patients were evacuated to the United States for chabilitation. Eighty two cases were battle casrenaphitation. Eighty two cases were nature case under and the remainder were actidental injuries

natited and the femalines were actionnal injuries.

The former before reaching the general hospital had

the same and order to same actions and the same actions are same as account to the same actions. Ane former octore reacting the general nospital national former would treet ment, including excision of damaged titue and immobilization in a splice cast or a Tobruk splint in an monitation in a spice cast of a contract and a specific injury Average time of 10 J nours after injury
of the lemonal shaft were severely communated and

or the removal shart were severely communated and involved from 2 to 8 inches of bone. Fifty-one per involved from 2 to 8 inches at bone. Fifty-one per cent were fractures of the middle third 30 per cent. cent were tractured of the minute third 20 per cent of the distal third and 20 per cent of the upper third

tine tenur.
The pressure method of reduction was that of The reparative method of reduction was tract for Tibial fraction was tract for a state of the land of the land of the land with skeictal traction Albies traction was reserved for the lower and middle thirds of the femur with the lower and missing turns of the result with Kirschner wire through the distal femoral fragment to Auscaner wire incouga the unital removal reaguer to control occasional posterior bowing of the lower fragment. into four groups

The authors have conveniently divided their cases

To four stours
Group 1 consists of 20 battle casualties treated Ortop 1 contacts of 30 Dattie essenties treated without acount closure of Penicilli, of which I were without sound costile of penicipin or which is which would and J see of the perpenetrating thish woulds and 3 are of the per hours after trauma. Because of definitive treatment management from higher schelars accordance to the per schelars. hours efter trauma. Because of definitive treatment of the wounding from higher echelous secondary closure wound dreams hood permitted. Skeletal traction of the wounding transferom, and drains on the state of the skeletal traction. of the wounds was not permutee Orcicus increasing blood translation, and drainge of wound drawing mood transmood, and drawinge of localized abscesses was the treatment of choice in location abscessor was the treatment of choice in this group. In 17 case the average time for wound Integroup in 17 cases the average time for wound the fact of the 3 of the cases had deep the same and the same area. neuting was 8 5 weeks The 3 other cases had developed outcomyeliks and presented poor results Bony open osteomyening and presented poor results soon union with fair alignment was obtained in 17 cases at the end of 9 weeks of skeletal traction.

the one of 9 weeks of accient fraction.

Group a consisted of 50 compound fractures tracted

monoid about a monoid monoid fractures tracted

and account fractures tracted. by wound closure and posicillin therapy in addition of the control to definitely and institute sugment they sugment to the su were subjected to hascotomy wound closure aking space to prevent pus pockets. Each patient of dead on nonlinka until wound hashing was nonconnection. aztistactorily

space to prevent pus pockets. Laco patient was kept on pealeiths until wound healing was progressing Group 2 4. Nine battle casualties which were treated the state as the cases in Group I developed ireated the same as the cases in Group 1 developed apparating wounds, of these fracture 3 were moderately as and 3 were suppurating wounds of tree fracture of were transverse fracture, 5 moderately 50 and 1 were transverse fracture, 5 cm Catalally 50 and 1 were commonly and 1 were a support of the support

transvene fractive. Seven casualties had sustained penetrating wounds and a perforating wounds for a perforating wounds. Skeletal fraction was maintain a consider a versue of a constant of the perforation of the penetration of the penetratio Skeletal traction was maintained for an average of 8 of rough 2.B. In this group there were at patients of the control of the Olivip 2 D. In this group there were 41 patients severely committed fem

TABLE I RESULTS OF TREATMENT

Group	K of	Renks		
		Geod	Falr	Peor
	*0			,
	•			4
	4	38		
		1		

oral fractures, and 8 moderately comminated fern oral fractures 2 had oblique fractures and 1 had a transvene fracture. Each pattent received approx imately three million Oxford units of penicifilin either before or upon entrance to the hospital. Twelve hours had elapsed before initial surgery was lone. Reparative surgery was instituted 9 days after the injury. The soft parts beaked in 4 or 5 days Callus was noted in 5 5 weeks and bony union ensued after 11 weeks. Good results were obtained in 38 cases.

Group 3 consisted of 12 cases in which wound closure was performed by the authors without the use of penicillin. In addition to the general treat ment, there was delayed primary closure without draining in this small group. Initial surgery was performed in 15 hours and reparative surgery in 6 5 days. Callies formation was noted in 6 weeks and firm bony unfort in 10 weeks. Good results occurred n. 11 cases and a fair result in 1 case.

Group 4 consisted of 18 simple femoral fractures, 4 of which did not respond to skeletal traction. These were subjected to open reduction, proper alignment being maintained with metal plates. The results were rated as good in all of the cases.

In conclusion the author maintains that penicillin and blood are of paramount importance in the prevention of sepsis and local infection. If however adequate preliminary surgery is not performed they alone are not a panacra. Reparative surgery of the soft issues consisting of secondary debridement and closure instituted between the fifth and tenth days, enhances wound bealing. The author also believes that the majority of femoral fractures can be treated by acketal traction when indicated he recommends open reduction of simple as well as of compound fractures. Samura L Governant, M D

Sorondo, J. P., and Ferré, R. L.; Knee; Fracture of the External Tuberoeity of the Tible (Redilla fracture de la t. beroeidad externa de la tibla). Res is méd especia 945 59 1 57

Fracture of the lat ral tuberosity of the tibla is caused by a violent valgus devastion of the knee generally accompanied by tomon while the knee is in extension and slight fiection. The chief fracture line is directed outward, downward and forward There may be secondary fracture lines.

The symptoms are pain at the site of the fracture, loss of function, swelling bemarthross, and excesavo lateral mobility. The reentgenogram shows the fracture line and fragments. The Internal fragment may not be visible because they are made up of joint cartilage. Surgical treatment is Indicated in all cases in which the joint nutrice is involved. The operative technique is described in detail and fluated with photographs and nontgeogram. Absolute ascepais in necessary ordinary surgical ascepts is not sufficient. The fragments must be true in place by some forcum material, such as a safe, acrew or a bolt with a nut on each end. I place cast is kept on for 3 or 3 months, after which master and active and passive mobilization of the bare a begun. After 3 or 4 months the patient may safe

with a cane if the x-rays shows solid bone called Within the past 21/2 years the author has operated on 8 cases. The late results cannot be reported by cause the time has been too short but the early results show that the disadvantages of operative compared with nonoperative treatment are the danger of infection, and necross of the fragments These can be prevented by the strictest ascre-The advantage of operative treatment is better reduction There is no danger of postoperathe rigidity as the internal lateral ligament and the cruciate ligaments are generally loosened by the trauma which caused the fracture. This cause a certain degree of lateral instability of the knee bot, on the other hand it favors mobilizatio when the AUDREY G. MORGAN M.D. cast is removed.

### ORTHOPEDICS IN GENERAL

Woolley P V., Jr., and McCammon R. W: Boar Growth in Congenital Myredems. J Public S. Louis, aux 7, 70.

The authors state that the chronologic appearant of ossification centers is a useful index to thyrid function in infancy but is too slow for use in the control of therapy in the young cretin. Normal lacer bone growth is suspended in the absence of the roxine, and roentgenologically visible changes occur within three weeks of the beginning of the admintration of thyrold extract. A curve of the some growth rate of the radius during the first two years of life is used as a standard for comparison that he radial growth rate in cretins before and during the administration of thyroid extract. Dense calculation at the epiphyseal plate, absence of carpal book and short radii are the roentgenologically recognit able stigmata of cretinism which are apparent before the clinical picture is clear-cut.

The findings in 3 patients from 2 to 4½ mostless age are described and in 2 cases correlated all a rays of radial growth resumption during three cartact therapy. Radial growth i thee case initially more raps I than the established nors, let levels off once the average growth is attained before my distance of the case of the case

This information provides a means of accurately regulating the thyroid treatment of cretic by

conthly x ray studies, and of establishing the diag sats of cretinism in infants under 2 years of age

Berman J. K.: Interacapulothoracic Disarticu lation of the Arm Swrgery 1945 18 250 Interscapulothoracic disarticulation means the re-

moral of the entire arm and shoulder This includes moves of the cuttre arm and another arm includes the capital, the outer two-thirds of the clavicle and

The discriculation permuts the complete excision And unaterconstruct permus the complete excessor of all anatomic lymphatics and lymph nodes all reat an amazonic rymphatics and sympu moves an re lated muscular and fascial planes and all involved sates muscular and instant phases and an involved axillary tisue together with the related bones. This may be done as a unit operation with less blood loss may be usue as a distributed to present the present th cism m a radical measurement of the same maps are used ally adequate so that skin grafts are ordinarily un

The mortality rate of this indical operation is no are marked that or constrained operations of the upper Strater than for ordinary amputations of the upper arm. Therefore aside from the disfigurement and ann. Americae some from the disnignation and inconvenience produced there are no objections to is use Certainly these are inconsequential objections. tions when compared with the additional chances for cure. If a portion of the arm must be removed then the inconvenience is not much greater and the

disfigurement though unsightly may be rectified by proper shoulder pads

The author defines the indications for the proand author ucinica the inducations for the procedure describes its reconsique and caus attention to the importance of this old operation under modern the importance of the out operation under modern dagnostic and surgical methods. Photographs and diagnostic and surgical methods. Photographs and photographs and photographs and photographs. tomicrographs are presented. Five cases without operative mortality are reported. The operation may be asfely done at any age. Soft tissue growths may be sairly uone at any age out ussue growns gave better results than lesions in bone. The former found in older patients were carcinomas

The value of properative focusing therapy has not been determined but roenteen therapy has not been determined but roenteen therapy us advised not been determined our rounged energy to advoce because it may lessen the chance for metastasis and occause it may reside the same of radio-local recurrence. It may reduce the sare of radiosensitive or infected growths and thereby facilitate

None of the patients had local recurrences The 3 dentis occurred from internal metastases they all

The end-results of interscapulothoracic disarticu At the encouraging of ancescaparocuronauc quantum attorn are encouraging Available statistics though meager prove that the operation offers a chance for cire in cases ordinarily considered hopeless

ROBERT P MONTGOMERY M.D.

## SURGERY OF THE BLOOD AND LYMPH SYSTEMS

#### BLOOD VESSELS

Freeman, N. E.: Secondary Hemorrhage Arking from Gunahot Wounds of the Peripheral Blood Vessels. Ann. Surg. 1945. 22 631.

Secondary hemorriage following gunabot wounds in the first world war was a common complication. Although present methods of districtment, insocial lastion, and chemotherapy have resulted in arriting reduction in the frequency of this complication, the occasional occurrence of severe bleeding often with disastrous consequences, still make this problem an important one. The author arrives at the following conclusions Insofar as his experience was concerned.

The incidence of secondary hemorrhage in 2,168 cases of gamshot wounds of the neck and extremities was 1 to 5 per cent. Of the 23 patients, 15 hied myounds of major blood vessels. The present study is based on an analysis of these 15 cases.

Laceration of the arterial wall, rather than complete severance, was found in the 13 petients whose wounds were explored. There were 3 deaths in the group. Two patients developed gas gangeme and if of these died. Ligation of the femoral artery resulted in ischemic gangeme requiring amputation in r case. Recovery took place in the remaining patients.

A listory of severe or recurrent hemotrinage in the forward area, or the presence of severe seems on admission, is indicative of injury to a large blood vessel. Secondary hemotrinage is to be anticipated in cases with these findings. In spite of a demon strated large opening in the main arrey of the extremity the peripheral pulse was normal in 6 cases reduced in a and absent in only a patients. Perfarerial bematoma was found in 4 individuals, but pulsation and bruit was present in only sof these. Perpheral edema or diminished sensation in the distal parts of the extremities was present in three-quarters of the cases with lacerations of the blood vessels of the extremities.

One case of rupture of an artenovenous aneutysm of the neck is reported. In a second case of second ary hemorrhage from the neck, the bleeding, which was definitely venous in origin, was controlled by suture of the tissues over the bleeding point. Both national recovered.

In all patients the major artery was exposed by wide extension of the original wound. Sature of the arteral laceration was attempted on a occasions. It was apparently successful in c case. In the second case thrombosis at the suture line extended down word and countributed to the development of gan grene. In the remaining patients the artery was divided and ligated with No r achomic catgut. No untoward results were observed after the use of this absorbable supure material.

The injection of alcohol into the region of the paravertebral sympathetic ganglia was performed in 4 cases with good results. In a fifth patient, procume was repeatedly injected.

A small initial bemorrhage occurred in 7 patient before the severe blood loss which prompted operation. Attention is again called to this red signifas an "inexorable indication for exploration of the wound."

Park Menerum Mn.

Eaton R. M., Czebrinski, E. W., and fmith, J L. Observations on Pulmonary Arterial Pressurand Peripheral Venous Pressure Influen-Arterial Blood Lots. J There, Ser. 1915, ir 339.

This contribution represents the first of a series studies concerned with polimonary and circuitary changes resulting from simple peripheral states blood loss. During experimental stakes by the authors on pulmonary lymph flow in what carrolled arterial bleeding was instituted, very consistent long changes, which were almost starting is their apparent import, were observed quite activities ally Pulmonary elema and pulmonary bemoving were produced at will by the simple removal a moderate to large quantities of blood from the formal artery the greater the blood loss, the praint the pulmonary damage. Insamuch as great and blood is such a common occurrence on the buffelds of the world, a study of the physiological factors involved in this pulmonary change exacts.

The authors first report the results of their experiments with a large group of dogs in which is per cent of the blood volume was removed, for it as thought that the loss of this quantity would sizekin a battle canualty. A second series of experiments will to per cent loss of blood volume was made to compare with an operative hemorrhage of about you can an everage human being. The methods of study are described in detail and the results are discussed at some hearth.

It would seem possible that the pulmonary cosgestion resulting from systemic arterial blood has b the result of increased permeability of the already endothelium, due to acute anoxia of the timed When the physiological events are reconstructed, as acute anoxla is apparent for many reasons. Breathing is noted to be rapid deep and forced an hangel has been produced and carbon dioxide concentration is increased With arterial hemorrhage, there is a true loss of blood volume and a decrease in available red corposcles to carry oxygen. The heart rate in creases in hemorrhage but cardiac output actually decreases. There is evidence that the circulation time is greater and that vasodilatation occurs Besides these factors, there are certain experimental observations which show that deep rapid, forced

SURGERY OF THE BLOOD AND LYMPH SYSTEMS respirations and attorns can produce increased pal monary transucation.

Multiplication consecution resulting from acute a block to normal circumstation.

arterial blood loss produces a block to normal circulation and an increase of pressure within the custion and an increase of pressure within the sampheral venous system, as well as within the pulscripheral venous sistem, as went as writing the pur-country artery. This pressure is developed within MOMENT AFTERN LIMIT PRESSURE IN DEVEloped within after the blood loss and om 30 to 30 minutes after the blood tons and the control to 30 minutes from the time of hemorrhage.

the on acmonmage.

The observations presented here are consistent The observations presented nere are consistent with those of the anatomic and clinical godings in with those of the anatomic and clinical undulys in bomb blast lang of a pathological condition brought comp outsting a pathological condition brought about by instantaneous overdistantion of the alreodi about by instantaneous overcustention of the avecuation of the avecuation to the chest well. The command with affect trauma to the enest wall. The most typical kation of bomb blast injury is before nost typical lesion of bomb blast injury is homorable and edema of the lungs and there is clinical mage and crema of the same and there is clinical fact might make it desirable to try venescetion as a act mean mase it desirable to try venesection as a conscribe heart failure.

ongenure neart tautre
The authors conclude that there is a gradual de The authors conclude that there is a gradual de than normal level weapons pressures to a lower from normal level within 114 hours of the hemor house of the hemor house of the hemor level. than normal level within 14 hours of the nemotion for the nemotion beautiful than the state of the nemotion has been shown accommodate. hate. Increased venous pressure ourng intra-ctions administration has been shown experiment by to clevate the venous pressure additionally venous pressure additionally

neliden, J. J.: Universal Vascular Compressor nsides, J. J. Universal Vascular Compression for the Development of Collatoral Blood Creating to the Collatoral Blood Creating to th for the Development of Colleteral Hood Orcal Island in Arterial and Arteriorenous Aneury and Arteriorenous Arteriorenou

The use of modern firearms has led to an increase in blood vessel infurer and arterial and arteriore in aloog vestel injurier and arterial and arterial consumptions. Since apostaneous recovery of these constraints in the annual constraints in the annual constraints. some stemptomes Since spontaneous recovery of these conditions is so rare surgical operation is the only believed means of treatment. The time of surgical operations of surgical conditions of the surgical condi Description of the state of the methorence is a controversian point. Some surgeons regard the second and third week after injury as the "Sking the second and third were after injury as the three to operate, while others wait as long as

are months.

Complete momentary ligature with sympathec plant of the Complete momentary negative with asymptotical strains of the complete ligature (Halster Matter 1997), the complete light li only (Mainer) incomplete Bailite (Mainley Media) the operation of Kikutai Sym (Mainer indice of Mainer of Auch) the operation of Aurusa Sym (negative managements). The operation of Mates (oblicestive of reand resembles assume for the processor. the sac) the operation of Matas (objiceative or re constructive) and varcular natures for the preserve then of vessel lumens have all been suggested for the treatment of arterial anasyrvams and arteriovenous toom to react tumors have an occur suggested to the categories of arterial aneutysms and arteriorenous

Since pathological changes occur in the vessel share in the blood vessel accompanied by the blood by the bloo wear, institute of the blood vessel accompanion of the sac seems to be the preferred oper described of the sac seems to be the preserved operation is stephically amplitude and consistent PRECICAL PRESENCE OF PATHOLOGY STORY "seams of the main arterial trunk is real as to per train of the cases in World War I showed this com Hiotion.

Surcous have been working on the problem of too to do to the limbs after arterial ligation to the surce of a montant state of the limbs after arterial ligation. prevening captering of the number after afterna uga-tion to decrease the number of annuations. Not

all artenes are equally affected. Likation of the an attenes are equally effected. Ligation of the populated arters is particularly hazardous nearly threaten the particularly hazardous Nearly threaten the pattern onth samula corollad attent on the pattern of the pat to per cent of the instrons of the extroit after the pattent with sections circulatory discovered to the brain. itounces of the Orain.

All Surgeous Agree that the necessity of pre-

In surgeons agree that the necessity of preinmany development of a counterst circulation is of counterst importance. Rather advocates sympathes primary importance. Rather advocates sympathec tony used in combination with mechanical compressions. tomy used in combination with mechanical compression, contrast baths, and disthermy to improve the collateral circulation.

olistical circuistion.

Mechanical compression of the arterial trunks a Mechanical compression of the arieral trunks at accomplished in most institutions with digital Pression and the pression of th accomplished in most institutions with digital pressure by a doctor or name. Thus a tiring and the pressure by the pressure of sure by a doctor or nume. This is thing and the presuperstandardly becomes more feeble until it is easen thatly of no value. It is not practical when several the same ward until from an entry with the composition is contracted to the particular to the particula patients in the same ward super from ancuryants in the compression is entitisted to the patient it is usually not effective

A tessel computator has been devised to obviate there difficulties Compressor has over devised to ouvertee to ouve inche omiculies Compression of the vessel is secreted by a secret rod fastened in a block at the reenected by a screw rod tastened in a Dioce at the re quired angle by a globular nut. This block moves along the grooves of the upper arm of the clamp to the clamp of the clamp along the 8000vs of the upper arm of the camp The hand wheel can be removed when the desired the hand wheel can be removed when the period degree of compression has been crisblanded to the degree of compression has been established so the patient cannot after the pressure himself. A constant or removable plaster bandage in which is a noticed to the patient. Com

A constant or removable plaster bandage in which clamp is fixed is applied to the patient. Compression of the common around is effected approximately at the livest plant of the Change pression of the common caroud is effected approximatery at the level of the Characteristic Uncerte per type of the atempole domain of the at tween the ends of the stemocletdomastoid muscle.

The patient is kept recumbent with the head slightly. elevated on a pillon

levated on a purior
Subclavian Compression is effected between the of avious part of the stemocladoms told mucle and the upper side of the clavicle The patient should Compression of the femoral artery is effected just beneath Poupart's ligament, above the transverse public.

The patient should be placed

At first the compression is applied several times a At first the compression is applied several times a the subcatvian and 15 minutes each time. Then for many the subcatvian and femoral attends, compression to the subcatvian for from the hours according to the hours according to the subcatviant in the subcatvia the subclevian and lemonal arteries, compression thay be applied for from \$ 10.3 hours several times a few standards of the complex times and the complex times as the complex times are times as the complex times as the complex times are times they be applied for from \$ 10.3 hours several times a day during the next week. For the common carried was the sharmoning the next times the sharmoning the state of the common carried than the sharmoning the sharmoni asy during the next week. For the common circuit seed Caution must be practiced at the beginning the State caution must be practiced at the beginning the compression about be applied for only 1 or 2 minutes that a time. Careful watch must be 1 or 2 minutes the compressions and other compressions of significance. at a time Carrier water must be kept for pares-thesis or paralysis and other symptoms of circulatory disorders

Just how a patient will react to carotid Pressure Just now a patient will tract to carotid pressure
show the prescribitive of a decrease is prescribed to hever can be predicted, and a case in presented to a dangerous reaction. In show the positionity of a dangerous reaction. In common a sample character distribution of sample containly rough Cause a serious circulatory disturbance in the brain.

Other wounded penticula best common circulatory are a serious circulatory disturbance in the brain.

And a serious control best common circulatory are a serious control present a serious control pr Other wounded patients pear common caroun pres-sure well and soon the artery can be compressed for aute weit and soon the aftery can be compressed for other transformers of the cannot state of the content of the cannot state of which long periods without unpressant consequences or car consequences o calatory disturbances. Une cannot guess in which causes compression of the common carolid for a long

time is safe. This can be ascertained only by careful observation at the time of compression

In the course of compression the limbs may be come cyanoid from proximal vein pressure. This is without dangerous after effects and may be counter acted by massage and warming. Canotid pressure may cause coughing from simultaneous vagus nerve pressure. If applied for a short time, compression does not cause painful sensations. If after a or 3 hours pain develops, it responds well to small does

of narrotics.

After the apparatus has been used it can be disassembled and the parts cleaned with alcohol and
packed away. The block, grooves, and globular nut
must receive particular care. The clamp is left
cemented in plaster but its grooves must be cleaned
well with alrohol.

To check the efficiency of compression, a sphyg mographic record of the arteries, such as the common carotid or subclavian may be made or digital palpation of the distal vessels carried out.

One patient completely recovered from an arteriovenous aneurysm after prolonged application of the compressor to the right subclavian artery His case is reported

In order to develop the collateral circulation, one must compress a single arterial trunk without disturbing the collateral paths.

Matas vessel compressor is unit for compression of the femoral artery immediately under Pouparts ilgament, as well as of the subclavian or carotid arteries. The proposed vessel compressor allows compression of nearly all the large arterial trunks such as the common carotid subclavian and femoral arteries, but it cannot be used for direct compression of the illucartery. When this vessel requires ligation the application of pressure to the femoral artery high under Poursat's allegament is recommended.

ROBERT R. BIGGLOW MLD

Whipple, A. O: The Problem of Portal Hyperton alon in Relation to the Hepatospienopathies.

Ann Surg. 1945, 133, 449.

This contribution is based upon experience and studies paned from the organization of the Spiken Clinic at the Columbia Presbyterian Medical Center in New York. In order to elucidate the pathogenesis, pathology diagnous and treatment of portal hypertension certain points in the anatomy and physiology of the circulation of the liver and subject are referred in detail.

spieca are reviewed in detail.

The amount of portal bed obstruction, and the type and site of obstruction are all variable factors in individual patients with portal hypertension. It is the discovery in the individual patient of these factors and their analysis that very largely determines the diagnosis, treatment and prognosis. Patients with portal hypertension may be divided into two main groups group I those having intra hepatic portal block and group II, those having extrahepatic portal block. In the first group the cirrhoses especially of the portal of Leannec type

are associated with portal block. The metral influence of the portal and arterial pressure while the lover provides an important explanation for the rise of portal pressure in portal circhost, so disexplains the variability of portal bypertenson as the criticoer and the presence or absence of garaintentinal hemorrhage as an accomposition of

portal hypertension. With regard to group II there are two types of obstruction seen in chronic occlusion of the nortal vein and its main tributaries. The first is a m placement of the vein or its main tributanes asis fibrous tissue with little or no canalization The second is a transformation of the portal reis at main tributaries, or the enveloping tissue into a cavernomatous mass of small tortnom vessels a process snoken of as cavernomatous transformation of the portal vein. In the first type of fibrous re placement there are two cannative factors. The most common is an organization into scar tisse of a thrombosis of the portal vein. The thrombosis may be the result of inflammation trauma, or present from without by inflammatory or neoclastic tesse. The second causative factor is an extension into the left portal vein, or proximal to it into the min portal vein, of the obliterative fibrotic process that takes place at birth in the umbiheal vein and dactor venosus as they empty into the left portal vein. The type of obstruction is rare but is seen in young children that begin at an early age to show ports block with splenomegaly and a Banti syndrome. The pathogenesis of cavernomatous transformation is not definitely known but it would seem logical that the etiology of this lesion is a variable oce

that the etiology of this lesion is a variable one. The collateral circulation in portal block has been classified as of two types, the "hepatopetals of the hepatofugale. When the circulation though the liver is unobstructed and the block is limited to the portal vein the blood may be shanted haven the hepatopetale collateral veins into the liver. In lesions causing intrahepartic block the bepatofught circulation shunts a variable amount of blood few the matterioritestimal tract and spleen around the

Both chronic intrahepatic block and extrahepatic portal block have been successfully produced in experimental animals. In the experimental samula and in many of the patients, portal bed block produces a fairly typical syndrome. This is true of the cases showing a splenomegaly whether the block s intrahepatic or extrahepatic. This syndrome conants of a variable secondary anemia, a leucopenia, a thrombocytopenia, a splenomegaly, and a tendeory toward repeated severe gastrointestinal hemorrhaps, most frequently associated with ruptured copiest cal varices. The liver may be cirrhotic or normal, according to the site of the portal bed obstruction This syndrome is frequently spoken of as Bantis syndrome It is the author's present concept that Banti s syndrome is the result of mechanical abstruction to the flow of blood within the portal bed In the cirrhoses there is a variable amount of portal

hypertension, determined by the amount of scar tissue in Glisson's capsule the relation of the prestame in the hepatic artery to that in the portal vem, and the extent of the hepatologale circulation. For and the extent of the neparotugate circulation. For these reasons aplenomegaly gastronicatinal hemory three tensors specimeness y sestimatement nemor rings [sucopenia, and thrombocytopenia are not mage recopenia, and unomocyopenia are not always found in the cirrhoses. This syndrome is not aways round in the critimoses and syndrome is not characteristic of the biliary and cardiac cirrhoses On the other hand if the extrahepatic portal block, On the other hand it the extranepatic portal block, from whatever cause, is sufficient to produce splenomegally Bants syndrome is nearly silvays specioniciany menus syndrome o neutry storage present, and a normal liver is usually found even in the cases of long standing

Patients with portal hypertension great enough to cause an enlarged spicen usually present leucopenia thrombocytopenia and secondary anemia of Banti a syndrome. There may be no history of gross gastro-Symmonic, Americanasy de no menory di gioca gastion intestinal hemorrhage, The differential diagnosis interinal nemorrnage ine differential diagnosis from other aplenomegalies is largely determined to the control of the control securate hematological studies. The site of portal block, as to whether it is intrahepatic or extrahe patic, can usually be determined by certain liver patic, can usually be determined by certain uver function tests. If the liver function tests are necessarily to the first state of the first state five it is safe to assume that the block is extrahe Patte. This does not determine the site of the certainepaire block, although the history or the age of the patient may indicate it. The author has been nable to determine the site of extrahepatic block at the time of splenectomy in more than half of his patients although recently he has been able to demonstrate the block by diodrast venograms and nenigenograms made during the operation at the time of determining the portal vein pressures

The therapy of portal bed block, both intra And uncapy of police we only the heart a hopatic and extrahepatic associated with Banti a yadome is considered in the discussion of treat ment. Three factors, the site of the block, the de Metic. Affect factors, the site of the proof, the use of portal hypertension and the extent and determine the content of the c Some of Portag hypercension and the categorian and competency of the collateral circulation determine the size of the spleen and the incidence of gastrointestinal bleeding. The two latter components of the syndrome are the usual indications for attempted ungical therapy. In the past, three lines of surgical states have been followed surgical states that the surgical surgical states have been followed surgical states and surgical states are surgical surgical surgical states and surgical surgical states are surgical states and surgical states are surgical states are surgical states and surgical states are surgical s Attack have been followed splenectomy the esactual maye peen ionowed spicinetions to co-called ablahment of a collateral circulation with omentopery and the ligation of tributance to the exophag pan and the upsation of all places is in the special panes, and the portal block is in the special panes, and the special panes of the portal places in the special panes of the portal places. with the removal of the spicen results in a permanent cone with disappearance of the Banti syndrome Unfortunately this site in the splenic vein is not a common one for portal bed block. However even mit the block in the main portal vein splenectomy of the for a warship time because of the provide relief for a variable time became of the temoval of a large area of the portal bed and until the portal by a range area of the portal root and united the portal hypertension builds up again. The effi Gey of omentopery is questionable. If the operation is done in the presence of a well established col historic in the presence of a west established the history venous circulation in the abdominal wall the months in the second state of the second seco statuts in a tew cases are encouraging out are properly due to Mature a clotts rather than to the surgeon s Attempts to ligate the tributanes feeding into the vents of the cardle and csophageal variess

have been disappointing Injection and congulation methods to obliterate the esophageal varies have nections to controlled the coopingest varies have not produced no improvement, since these methods shut produced no improvement, since these methods shut off one of the chief collaterals between the portal and on one or the contraction and increase the portal hyper systemic circulation and increase the portal ayper tension. The large number of patients with portal vein block and Banti a syndrome who had spience tomy but who continued to have recurrent gastrotony out who continued to maye recurrent gastro-integral hemorrhage challenged the members of the Spicen Clinic to seek a more effective and

Efforts to anastomose branches of the mesentene Elloris to anastomose prancies of the mesentene veins to the spermatic, the oversan and the inferior vens cave by suture technique failed When Blake vena cava by anture technique raued when place more and Lord developed the endothelial lined in the capacity of the capacity o vitallium tabe nonsuture technique for bridging large vessel defects it was decided to apply this large vesses deserts it was decided to apply one method to portacaval shunting operations. With method to portactival anunting operations this principle, to of these major procedures have been carried out, 5 by union of the aplenic vein and been carried out, you amon or the spicine you and left renal yeins after removal of the spicen and left tert remai veius atter removal of the spicen and left kidney. In the last 5 patients the portal vein was ansatomored to the inferior vena cava end to side All the patients have survived their operations. The on the Patients have shown such improvement that the results in 5 nave anown such improvement that the application of portacaval anatomous by the non suther technique is being extended. It will require a suture technique is being extended. It will require a follow up period of at least three years to determine the value of these procedures

Blakemore A. H. and Lord J. W. Jr. JOHN L. LINDQUIST M D seniore A. 11 and Lord J. ); Jr inc ieco nique or osing vitantium rupes in estraorismus Portacral Shunts for Portal Hypertension

Since Eck first performed successful experimental Office LCR HER personned successful experiments anastomosis of the portal vin to the vens cava supperson have been interested in the clinical applications of the Park Saraha Contained and the clinical applications of the Park Saraha Contained and the clinical applications of the Park Saraha Contained and the Contained Saraha Co augusta have even interested in our control appearance of the Eck fistula for the relief of portal hyper Cation of the Eck institute for the rener of portan hyper tonsion. The rare reported instances of attempts at the establishment of portacaval should attempt at any should be a stablishment of portacaval should be should the encountement of portacaval angular by sucure and the discouraging results signify the technical obstacles to its clinical application. The developoustactes to the cument approached. And develop-ment of the vitallium tube nonsuture method of ment of the vicamum care nonsucure mechanical blood versel anastomosis has afforded a new method blood vesser anastomosus nas autorued a new metnod of accomplishing either splemorenal anastomosus or portal vene caval anastomosis

Splenorenal anastomosis is capable of handling a Openotenal anastomosis is repeate or manually interesting of blood and has the peruliar advan tage of chainsting a sixable portion (estimated at tage of cuministing a sizable portion (committee at 40 per cent) of the total circulating portal blood volume by splenectomy. The authors coincil end younge by specifications are summer cannot be specification of the state of the sta sanatomoria of the spiente vein to the left renal vein. Renationions of the spicine vent to the relativest vent.

The facility with which an end to side anatomosis may be carried out with a witallium tube affords an alternate method to the sacrifice of a kidney exercises method to the sacrifice of a kidney. The serving the full length of the splent and pre-Reving the full length of the pilenic vels with min serving one into region or the spicine vein with min-imum trauma during spicinectomy. The spicine artery is ligated and the spicine is somewhat complicing of the blood. The spicine is somewhat complicing the spicine spicine spicine is through from the first of its blood. The spience vein is ligated just at its

primary dutal branching. The blood is then milked far proximalward in the vein and a rubber-shod clamp applied. Following removal of the spleen the stump of the splenic vein is opened triangulated with clamps, and irrigated with normal saline solu-

The left kidney is removed, but a maximum length of the main renal veln is preserved for the anastomosis, and a rubber shod clamp is applied as far proximally as possible. The stump of the renal vein is treated in the same way as the stump of the splenic vein and a proper sized vitallium tube is selected. The end of the splenic vein is passed through the tube, triangulated and everted over the end of the tube. The vein is held in place by a liga ture of silk placed behind a ridge on the tube. The intima covered end of the vitallium tube is introduced into the renal vein and a ligature is applied over the vein proximal to the ridge on the tube. A second ligature is used to approximate the renal vein anugly to the splenic vein near the end of the tube. The latter ligature prevents blood from penetrating between the two intimas. The clamp on the splenic vein is released and immediately following the clamp on the renal vein is released. It was necessary to resort to a veln graft in only 1 of the 5 CASCS.

The Eck fistula type of portacaval shunt has the advantage of size. An end to end anastomosis of the portal vein to the vena cava by the nonsuture vital lium tube technique affords an estimated blood carrying capacity from 30 to 40 per cent greater than a splenorenal anastomosis. In order to avoid the un desirable use of a vein graft it is necessary to mobilise the portal vein from its bifurcation at the liver to the origin of the splenic vein. The portal vein is mobilised, to protect the common duct and hepatic artery from injury and a rubber shod clamp is applied to the portal vein at the origin of the splenic vein. A transfixion ligature is placed around the portal vein at its bifurcation close to the liver, and the vein is transected distal to the ligature. The vena cava is mobilized from the level of the liver down past the entrance of the left renal vein to the upper level of the right renal vein and a clamp is placed but not tightened at this time. The portal vein is passed through a vitallium tube and cuffed over the end of the tube and ligated behind the holding ridge. The vein covered vitallium tube is now swung out from behind the common duct and over the vena cava, and a site for the anastomosis which will not result in angulation or compression of the vein is selected. Two nume string sutures of allk are introduced into the full thickness about the site chosen for anastomosis to form two circles the diameters of which are 4 and 6 mm. larger respectively than the diameter of the vitallium tube. A second clamp is placed at the upper part of the mobilized vens cave and the distal clamp is tightened to occlude the vens cava. A cruciate incision is made through the vena cava wall and the apex of each quadrant grasped with mosquito forceps. The veins are irrigated with

saline solution and the vitallium tube bearing the portal vein is advanced into the opening. The harpurse string suture is tied proximal to the ridge on the tube. To establish the blood flow the product clamp on the vens cave is released first followimmediately by release of the clamps on the porul vein and the distal vena cava, respectively

This article is based upon experience gained is the establishment of portacaval shunts in 10 case (s splenorenal anastomoses, and 5 portal vein to ven cava anastomoses) Convincing clinical evidence of portal hypertension should be procurable in the we majority of cases preoperatively One can accountly predict on the basis of liver function chemistry whether portal hypertension is due to intrahentic (portal cirrhosis) or extrahepatic portal bed bled. The variable origin of the coronary ven from the splenic or portal vein accounts for the presence of absence, respectively of esophageal varies in cogestive splenomegaly due to a block in the splene vela.

Splenectomy alone as a treatment for magestive splenomegaly should be limited to those cases of splenic vein thrombosis in which the connary vein arises from the portal vein, or if it arise from the splenic veln, to those cases in which the obstruction is dustal to its origin. At operation in case of congestive splenomegaly due to extrahepatic ports block, venous pressure readings are essential to de termine the obstruction sites in the splenic veh. normal reading from a branch of the superior meanteric vein and an elevated reading from a branch of the coronary vein of the stomach would indicate a block in the splenic vein and suggest that the coronary vein originates from the splenic ven distal to the site of the obstruction. This evidence would make splenectomy followed by splenormal anastomosis preferable to splenectomy alone. Is a case of congestive splenomegaly in which the superso mesenteric pressure is normal, the spicele von pressure elevated but the coronary vem present approximately normal, a solenectomy alone would be indicated. Venography following injection of diodres in a branch of the coronary vem is useful in maint ing the site of origin of the coronary vein. In most cases of cavernomatous transformation of the portal wein aplenorenal anastomous is likely to be the only type of portacaval shunt it is practical to use. It was found feasible in I case of atrests at the porter fissure in which the spleen had been previously removed to do a portal to vena cava anastomosis will a vein graft.

Every one of the 10 cases of portacaval sharib went through a successful postoperative convictcence. The interval following operation has been too short in some to judge the results. However, h 6 of the 10 cases the improvement has been so out standing that it justifies continuation of the procedure. The Eck fistula operation is better tolerated by the patient, in all probability because of less blood loss during the procedure.

JOHN L. LINDQUIN, M D.

# SURGERY OF THE BLOOD AND LYMPH SYSTEMS LYMPH GLANDS AND LYMPHATIC VESSELS

David, P. : Hodgkin a disease (La maiadie de Hodgkin) The author presents a table shoring the details of

The author presents a taue snowing the octavis of the findings in a careful study of 30 cases of Hodge has findings in a careful study of 30 cases of Hodgs three types of Hodgs and Parker have described findings. Hodgs in a disease Hodgs and Hodgs three part of the disease) and Hodgs in state of the finding types of the disease) and Hodgs in state of the disease) and Hodgs in state of the disease of the di Cantest type of the cuseases and roogens assurome the prognosis in these conditions depends on the conditions depends on t The prognous in these conditions depends on the type of the lexions. If this classification should Spe of the leatons II this classification anomal important contribution to the

Welther Stemberg nor Reed discovered the cells Neither Sternberg nor Keed discovered the cens which pear their names the frequency of the disay whether professing the second to the disay whether professing the second to the disay whether professing the second to the second to the disay. case increases with age at it as yet impossible to produce the state of the state o asy waterner modern a concase is intermous or new-Pastic in nature at is a pordering cuesse winds the apecually important. Gordon thought he makes it especially important. Gordon thousant ne bad discovered a virus for it but was unable to prove And discovered a virus for it but was unable to prove the account to the first is of some value. Poston described brucella meliteria in 14 consecutive discovered officers mesticasis in 14 consecutive consecutive accounts and this may prove to be the causaline accounts an amount of the causaline accounts and the causaline accounts an

Age and this may prove to be the causative agent printing is a secondary symptom which is not very Education is a secondary symptom which is not very that disease to three types of lever the secondary symptom which is not very than a no superhood education in the secondary by equent the author has seen three types of fever the disease. If there is no superioral adenomethy it may be impossible to make a diagnosis of abdomi nal Hodgkin's discase

as crouping disease.
There is no typical blood picture in the disease but
the blood distance may be an aid in discourse. yet the blood picture may be an aid in diagnosis Eognophilla is raise

Ectinophilis is rate

ray or fadium free finited picture is very seven free free fixed extensional be given free free fixed extension of the glands for any fixed extension of the glands for the fixed free fixed free fixed free fixed free fixed free fixed free fixed for fixed free fixed fected cases surgices exturpation or the grands tother the surgices of radium therapy has given very very the surgices of the one by toenigen or radium therapy has given very stands about a family visible hypertrophy of the his survivats Any visible hypertrophy of the examined at once by means of the history and have been seen in figures should be examined at once by means of the cases of surpress have been seen in Suppry The longest survivals have been seen in the cases of early removal of Hodekin stands

AUDRIC G MORGAN MLD

Characte, IL: Tamora in One of Homologous Tyling, Drimary Kesistal aracte, it.: Tumora in One of Homologous; with Primary Skeletal Madifestations. As J. Rosal, 1945 54, 179.

The author reports the fifth case of Hodgkin's in the literature was monologous from the first 2 case of the first property for the first 2 case author was monologous from the first 2 case. the literature were reported by the table authors. The patient was a white female aged 5 years one of hopologous twins white ternale aged 5 years one make him and white a history of pain in the of homologous twins with a history of pain in the hight hip and right shoulder fever and loss of saids from poor mirration fever increase in the action of ten weeks duration on examination, on he and account in the second se while HOM POOF MUNION LEVER MICRARY IN LINE COLOR OF THE Pune and respiratory lates and sensory was main installed to the disease were limited to the roentgen

Rodeth a disease in one of homologous tring (Healthy twin refused to take of shoes.)

andings of areas of rarefaction in the panetal region of the skull, the right classice, and the right items to the right thin and classicians are the skull and the right items. of the skull, the right clavice, and the right illum of no benefit and the child died one month after the mean shorts, after the child died one month after advice was the child died one month advice was the child died one Of no Deneut and the critical allest one month after an about a first the origin of a biliteral power of the critical and the mestion anorth after the omet or a matterst pneumothors. Postmortem cramination revealed Hodge the state of the throne cervical lymph nodes king disease of the taying cervical tympa noote and large with scondary emiver spicen comes and nings with a The resident change beamouthous statements. bysems and observed pneumoinous.

The patient's homologous twin was last cramined when months after the observed of

The patient a homonogous twin was see casement of the character of homologous twin was see casement of the consecution of the c Jour Jean and clear months after the observed the decreased homologous twin. Phys. Symptoms in the decreased nonnovorus twin. 1703-2-51 control of the control of th ical examination, including roemic anographic study of her skeleton and lungs showed no evidence of any of her section and lungs showed no evidence of a hotological condition. Expert E. Arbithe, M.D.

### SURGICAL TECHNIQUE

#### OPERATIVE SURGERY AND TECHNIQUE POSTOPERATIVE TRRATMENT

Lovell, D L.: Skin Bacteria: Their Role in Contamination and Infection of Wounds. Arck. 945 51 78.

Investigations were carried out to determine the type and number of bacteria gaining entrance to the wound during the course of routine operation and their role in the infection of the wound.

To determine the number and type of organisms gaining entrance to the wound during operation

cultures were taken as follows

- 1 After proper skin preparation a sterile sponge, thoroughly moustened with isotonic solution of sodium chloride was rubbed over the skin. The saline solution was then expressed from the sponge into a sterile container. All this solution was cultured by the pour plate method. After 24 hours of incube tion, the number and type of colonies present were recorded.
- a Immediately after the increase in the skin had been made, towels were clipped to the edges to prevent, so far as possible surface bacteria from get ting into the wound. The wound was then irrigated with a small amount of isotonic solution of sodium chloride and the solution cultured by the method previously mentioned

3 After the primary object of the operation had been accomplished the wound was again irrigated and the solution cultured.

4. After the wound had been closed the towels were removed, and the final culture was made from

the surface of the skin

Although there is no accurate method of recover ing all the organisms in the wound or on the surface of the akin, the procedures used gave uniform re sults which were satisfactory for comparison. All operations were performed under bactericidal radi ant energy to minimize contamination from the air

Cultures were taken during 55 operations for inguinal hernia and during 115 operations of other types. Few organisms were obtained from the sur face of the skin immediately after mechanical and chemical cleansmg. Some of the cultures were ster ile, but of those which grew organisms the greater number presented the staphylococcus albus. Other bacteria, including the staphylococcus aureus, the escherichia coli, and a nonpathogenic fungus, were present occasionally in small numbers.

In the second culture, it was shown that in most instances a few organisms were carried into the wound with the skin knife. They were of the same variety as those obtained from the surface of the skin were relatively nonpathogenic, and belonged to the rendent flors.

The number of organisms obtained from the wound just before closure was considerably greater than the numbers recovered in the first tag of tures. This was probably due to the fact that the bacteria which gained entrance to the wound me tiplied during the time of operation.

A large number of organisms were obtained from the surface of the skin after closure of the worm This was thought to be due to the resident for rising to the surface and multiplying during the time of operation.

The number and type of bacteria obtained from the surface of the skin immediately after medicaland chemical eleansing did not vary greatly with the character or location of the operation. The number of becteria removed from the wound before down was greater in the operations for inguinal brok than in the other operations. This was thought to be due to the presence of numerous bair follows in this region which results in a larger rendert fan

During operations the skin should be considered contaminated at all times regardless of the propertive preparation. In closing the wound the towns should be left in place until the wound is closed to the subcutaneous fascia. At this time the surface of the skin should be considered much more contain insted than at the time the original increase in the akin was made. The towels should then be removed the surface of the skin cleansed with the antisepte solution, and clean sterile towels placed over the area before the sutures are inserted in the stin Stitch abscesses are best avoided by the additional precautions of carly removal of the suture and the avoidance of tension. Lucian J Fromon, M.D.

Starr I., Mayock, R. L. and Battles, M. G.: Convalescence from Surgical Procedures. Stude of Various Physi logical Responses to a Mile Exercise Test. Am J II Sc 945, t 713.

The aim of the authors investigation was to es plore the possibilities of finding objective methods of demonstrating abnormalities present in coavalecence after surgical procedures which would serve as an indication of the duration of the convalenced state and as a test of measures designed to shortes it. The authors believed that no abnormalities than acteriatic of convalencence would be demonstrable while the patients lay at rest, but they hoped that when the patients performed a task, abnormalities might manifest themselves. For this purpose as casy weight lifting test was devised which could be performed by the subject while lying in bed on his back and breathing from a spirometer designed to measure the basal metabolic rate. By this mean oxygen consumption could be determined without gas analysis and both the rate and volume of reco ration estimated from the spirometer record as ad

Oxygen consumption and volume, and the rate of respiration were determined before, during, and after standard exercise. The cardue output (belistocar

diogram) and pulse rate were estimated before just Oxform) and pure late were estimated below after and 5 minutes after the same exercise tter and 5 minutes after the same exercise
Measurement of the magnitude of the changes in-Measurement of the magnitude of the changes in-duced by the exercise revealed no significant differ duced by the exercise revealed no significant difference which could be attributed to convalence. ence which could be attributed to conveneecence.

However, when attention was given to the duration.

And the state of the conveneecence of the conveneecenc

However when attention was given to the duration of the changes induced by the exercise the average of the changes induced by the exercise the averaged asparation of differences the increased exygen tooped significant differences the increased oxygen conumption respiration, and pulse rate decuning to the realing level more alowly during convalence to than before operation

han before operation
The respiration and oxygen consumption of sub-The respiration and oxygen consumption of sub-jects at test were not significantly changed during OFFICECENCE.
The variability in the physiological response to

the variability in the physiological response to CHICLE & SO STORT THAT A TOTAL THE TYPE USED SIVER

AD PROMISE OF PROVIDING & RAILMACLOFF MUSICIPE SIVER

A CONTROL OF THE PROVIDING OF THE PROPERTY OF THE PR no promine or provious a naturactory incessive on one of convalencence in individual cities. How were the slow return to normal of the Pulse rate Ter, the allow return to normal of the pume rates an indication of personal returns to mormal of the pume rates are an indication of personal rates. appraison, and oxygen communition siter exercise why have some value as an indication of permitting abnormality in certain individuals and will provide anomality in certain individuals and will provide Affinicant differences when data obtained of 10 or more cases are averaged

Craking J.P.; The Effect of Postoperative Energy and Massacan on the Invidence of Pull

ikine J P. The Effect of Postoperative ExerClass and Massage on the Incidence of Pul
Nonery Embolism at the Chelsea Hospital for monery Embolism at the Chalses Hospital for Challes 1045 51 482 Postoperative exercises and manage were introducid at the Chelses Hospital for Women in 1937 in aucturat the Cheises Hospital for Women in 1937 in an Atlempt to reduce the incidence of pulmonary

The incidence of fatal embolism following about the control of the Ane incidence of latar embousm ionowing ause subsequent 7 year period
The deaths from embolism are reviewed with re And coexist from emposium are reviewed with re-lation of course, includence age of the patient, and

The of operation.
Some details of the exercises and massage em physical are given and are followed by a short da-cussion with references to the recent interaction from J. Mattower, M.D.

ANTIGEPTIC SURGERY TREATMENT OF JOHN J MALONEY M.D.

Enns, E. I. and Blasser I. A.: The Rationale of Section 102(12) Con. Therapy in Series Borns Asy WOUNDS AND INFECTIONS

The main purpose of the authors attudy was to of burn short in the management burned traitent. Blood from the management burned rattent. cyaliste whole blood framiliation in the management of burn shock in the severely burned patient. Blood with management of the severely burned patient belook of the severely burned patients. on burn shock in the severely numed patient. Shock soon after the large land large l Accepted in the pure had been received indicated a decrease in the pure had been received indicated a sound of the pure had been received indicated a sound of the pure had been received in the pure had been received soon after the burn had been received indicated a detrease in the total circulating red cell mass. It is account for a considerable portion of the "masked that have been a considerable portion of the "masked masked that "masked the "masked that the "masked t perieved that this initial loss of red blood cells may account for a considerable portion of the 'masked mapy burn nation's Other than a deficit in the result in the consideration of the 'masked in the post-above period in many burn patients of the post-spock period in the cell mass some attack. Other than a deficit in the red cell mass some attack home to accord the center of many burn patients. Other than a deucit in the red cell mass soon after the burn is received the cause of

the early anemia in burn patients has not been duthe cary anemia in Durn patients has not been our closed by any studies made by the author. The closed by any studies made by the authors inc authors do not believe that intravascular neurouses is responsible for the major portion of this red cell in responsible for the major portion of this red cell defect because in many patients there was little or no account of the contract of the co denot because in many patients there was utile or no staming of the plasma with free hemographic they staining of the plasma with tree bemograph they are of the opinion that the red cell deficit is due in are of the opinion that the sentence is one of the main to studying or trapping of large matter of the main so that the sentence is one of the matter of the main adminion the main adminion the matter of the matter of the main adminion the sentence of the main adminion the sentence of the matter of the main adminion the sentence of the main administration and the sentence of the sentenc the main to studging or trapping or large meases or red blood cells in the capillaties in and adjoining the red blood cens in the capitality in and automing the burned area. The beneatocrit data do not necesburned area. The bematocrit data do bot necessarily indicate the extent of the anemia in burns sarry indicate the extent of the anemia in burns and red cells are lost in da-

especially when pussing and red cells are seen proportionate amounts into the burned area. reportunate amounts into the outner area.

The general plan of a clinical experiment was to The general plan of a clinical experiment was to give intravenous whole blood infusions of 500 to 1.000 to 1.00 Eve intravenous whose blood insusons of 500 to 1000 cc every 6 hours for the first 48 hours along 1 coo c.c every o nours for the next 48 nours along the enough saline and other fluids to keep up a with enough same and other during to acrp of acres on the market of from 50 to 100 CC. Per hour of the market of t Every effort was made to have the patient take Every chort was made to mave the patient take than by the intraveous fluids by month Rither than by the intravenous control of the form of maker soft. route Finds were given in the form of water soft drinks, milk, or fruit juices For children of from 1 blood were usually limited to from 150 to 500 Cc.

blood were usually limited to from 150 to 500 CC.

This is a month of the company in all burned patients every cutor was made to give the amount necessary to keep the whole blood up to the amount necessary to keep the hemoglobin level above 100 per cont during the mass of the and to all nations. Bright to the source to all nations. Prist 4 days of therapy venicum number daily was given to all patients. units delly was given to all patients.
When burn patients were given plasms above, even in large amounts it was not unusual to and not continued to and the fourth of 60th des.

even in large amounts. It was not unusual to find the fourth or fifth day. low plasms protein levels on the fourth or fifth day extensive On the other hand in the series of burns of with barre amounts of whole blood of while blood of while blood of while blood of criensive On the other hand in the series of burns plasms, protein levels were exhaults of whole blood the nearly the optimizing level. This may have been due to the conserved blood flow through the liver during the plant of the nearly the other been due. pearly the optimum level. Into may have been due to improved blood flow through the liver during the shock. And consequently law house. to improved blood flow through the liver during the period of burn shock, and connequently an anoma in the patients treated with whose first one of the advantage of blood. anoms in the patients treated with whole blood therapy may be the maintenance of the state that plasma protein moderate. blood therapy may be the maintenance of the liver in such a state that plasma protein production is a more nearly normal management. in such a state that plasma protein fooderion is a more nearly normal mendection in the initial burn period. The authors food it nearly output even when a good urinary output even when the initial burn period. The authors found it pos-sible to maintain a good urinary output found it pos-hemoconcentration appeared to output cren when The impression was taste these be gotte market had been treated with whole blood above of tast who

The impression was that these than patients who does from patients who also others receiving planes of the form of the state of the sta had been treated with whole blood there are than did others receiving plane or relative with which shows have been please or relative with which Krowth of epithelian with the apolitic areas that at first appeared of a denis, and with which growth of epithetiam has been place in require extensive although a depth and a copta and a burned areas that at first appeared of a certain to require extensive sails sails and option and the hemoconcentration has been faint, and one faint and one faint and one faint and one Creased incidence of thrombons in hor with hemoconcentration has been been been patterned to give whole been been failed and one with hemoconcentration has been fated and one in the interesting to note that he to the reason, it is interesting to note that he to the reason, of the contract of the contra might besitate to give whole blood by the source of the so

Ungley C. C. Channell, G D., and Richards, R. L.: The Immersion Foot Syndrome. Bril. J Surg 1045 33 17

Prolonged exposure of the extremitles to moist cold insufficient to cause theme freezing produces the well defined syndrome of immersion foot. In the natural course of a typical case of immersion foot there are 4 stages the period of exposure and the prehyperemic, hyperemic, and posthyperemic stages. During the first two stages the feet are cold numb swollen and pulseless, and pain is not a prominent symptom Within a few hours after rescue the feet become hot and flushed and the pulses are full and bounding. With hyperemia comes pain which is se vere, burning or throbbing in character and in creases in intensity for from \$4 to \$6 hours. Swelling increases with the hyperemia, and there is a rapid recovery of sensation from above downward until from 7 to 10 days after rescue, when a relatively sta tionary sensory picture is obtained Typically the sensory loss is of the "sock" or carpet alipper distribution. Further recovery of sensation is slow and is dependent upon the regrowth of nerve fibers. Areas that are to become gangrenous fail to warm, remain white or blue, and blister extensively. The duration of the hyperemic stage varies from a few days to months according to the severity of the case The posthyperemic stage may be absent in mild

cases, but in the typical case it is first manifested by a change in temperature of the feet, which become cool on exposure to mild cold. The feet remain cold for several hours and later may become permanent ly cold and "cold-sensitive." In some cases the feet are also heat-sensitive. Spontaneous excessive sweat ing of the feet is a prominent feature of the post hyperemic stage, and recurrent swelling tingling or shooting pain, and blistering are other complaints. In about two-thirds of patients with immersion foot the hands are also affected, usually less severely

When a limb is immersed in cold water the tem perature of the digits falls rapidly to within r to s of the water temperature. The earliest records of akin temperature in immersion foot syndrome have been made in from g to 12 hours after rescue. At this time the digits were already warm and within a few hours reached full vasodilation level. Once the hyperemic stage is fully developed the hand or foot. except for gangrenous areas, is warmer than the upper arm or thigh and the normal vasoconstrictor gradient is abolished Reflex vasomotor activity in response to heat or cold is absent, but returns grad ually In the posthyperemic stage the feet are al most habitually cool, and many degrees of reflex vasomotor activity may be observed. In the more severe cases there is complete failure of raflex vaso-

In the experience of the authors, the most signif icant factor in prognosis is the amount of damage to the peripheral nerves. A useful criterion is the extent of loss of sensation to cotton wool touches at the end of the first week, and cases have been subdivided into 4 groups on this basis

Grade A Minimal cases without interference or with transient interference with nerve function Grade B Mild cases with reversible nerve day. age.

Grade C Moderately severe cases with incren-Ible (degenerative) nerve lenous.

Grade D Severe cases with irreversible nerve is

slons and gangrene.

The essential cause of immersion foot syndrone is prolonged exposure of the limbs to cold insufficient to freeze the tassues. Contributory factors are malnutrition and exhaustion, and the relative immobility and continued dependency of the feet. Methesical interference with circulation as from tight dotsing or shoes is a factor Chilling of the upper part of the body from wind and wetness acts by reducing peripheral circulation. The disorder may arise a extremities exposed to prolonged cold with no mor damp than is provided by condensed perspiration.

The difference between frostbite and immerior foot is important but is not always dear cut. Is general, froatbite causes death of three by freezing and skin, being most superficial, suffers most, in inmersion foot there is prolonged chilling and inchess, which affects the tissues with the lowest belopping resistance namely nerve and muscle, most severly Even with irreversible nerve damage there may be

no loss of akin.

In the series of patients observed by the author, there were two groups of survivors from shipweek in warm waters. Edema of the feet may followerposure in open boats, in the tropics. This grow does not form a simple clinical entity Many of the cases resemble the peripheral vasomeuropathy of served after chilling. A number of factors are past ably involved such as immobility and dependency of the feet, unmersion in warm sea water semi-stuvation, dehydration, and the effects of sunlight.

Pathological material obtained from tienes affect ed with immersion shows that nerve and muscle fer most severely The peripheral nerves undergo a process of patchy Wallerian degeneration. Charge are most marked in the distal portions of the nerve, and fibers of small calibre appear to suffer more severely than large medullated fibers. The cinical and pathological evidence is in favor of the hypothesis that during exposure and in the prehyperesis stage intense vasoconstriction is the predominant feature. The combination of chilling and ischema gives rise to a peripheral vasoneuropathy The carly hyperemic stage appears to be due to release of stable vasodilator substances in the tissues, and once the effect of these has subsided, the hyperenia is saintained because of paralysis of peripheral vasors strictor fibers. The late vascular phenomena are more difficult to explain but it is assumed that the are the result of denervation and the subsequent in innervation of peripheral blood vessels, which may also acquire a sensitivity to cold analogous to that seen in the Raynaud syndrome.

In discussing the treatment of immersion lock confusion has arrien because methods which are of

value in one stage have been wrongly employed in value in one stage nave ocen wrongly employed in another. During the prehyperemic stage the authors advocate an intermediate course between cooling to advocate an intermediate course between cooling to 3 to 5 C as advocated by some and rapid warm into the degree to 3 to 5 C as advocated by others. The degree ing to 37 the as advocated by others and degree of warmth applied should be no greater than that a maniata spines snown be no greater than that seeded to permit relaxation of the arteries. While marming the body exposure of the extremities to a warming the body exposure of the extremities to a cool atmosphere (18° to 23° C) appears to be logical cool almosphere (18° to 22° C) appears to be logical and satisfactory. It is emphasized that efforts to and saturactory it is computation that curous to hasten the release of viscocontriction, whether by body marming, local marmth sympathetic block or body warming, wear warmin sympathetic bloca, or drugs may do harm unless steps are taken to control dugs may go narm unious steps are taken to control the degree of vasodilation when it occurs. During the hyperemic stage several methods have been sug the appetence stage several methods have been sug feated to limit the excessive exudation set up by a too rapid return of circulation Treatment by cooltoo rapid return of circulation treatment by cooling alone is often sufficient and should begin as soon ing atone is otten aumicient and should begin as sout as visodiation develops. The optimum cutaneous as vasodiation develops The optimum cutaneous temperature for prolonged cooling is 21 C. In the posthyperemic stage and for the late sequel of a pointyperemic stage and for the late acques of a cold-sensitive state a warm covering is demanded not only for the affected extremities but for the rest not only for the allectron extremities out for the real of the limbs and for the trunk. Smoking should be At the times and for the trunk Smoking about the orbidden if there is a tendency to vasorpain. Oc orman in there is a tendency to vasospiasar or capational therapy is of value. It is in this stage that sympathectomy or sympathetic block may prove of value in treatment.

Blackburn, G., and Rob, C. G.: The Abdominal Wound in the Field Eril J Surg. 1945 JJ 46 The treatment of an abdominal wound commences the treatment of an audominal wound commences included the first wounding and restriction is important. This usually consists of warming and account of warming and account of the contract of and morphine but plasma has saved many lives in exceptional cases blood has also been used this an exceptional cases about this also over used one carly to great advantage. Evacuation should be carry to great advantage. Evacuation anomal recorded out with the transfusion running as a scoon removiration as for more allowable and lengths then Remediation is far more difficult and lengthy than resucciation is far more difficult and lengthy transfers a greater use of the "In ambulance transferson is declarable. The morphine is preferably property of the state of the nanon u desirable. The morphine u preservoy, five intravenously but will rarely be needed after sorn intravenously but will rate;) be become and Center Here the amount of further resuscitation re onter there is amount of further remaintanion at the guiding factors being the querg is assessed the guiding factors being the blood pressure pulse rate, and state of the peripheral circulation it should always be remembered of commentations of the state of the peripheral properties. Course that ether used as an anesthetic is a stimu toute that einer used as an anesthetic is a source last, and that the relatively slow pulse of the average thoracouldoninal wound will quicken dramatically when the pleura and peritoneum are opened. However, the mandature of these manifests have best blood for the manifests of these manifests have best blood for these for these for these for the manifests of the m tree the majority of these patients have lost blood which requires equivalent replacement (a pints are and requires equivalent replacement to place are transfer with plasma to follow as required. availy foliation) with plasma to lossow as required immediate operation is undertaken only on account. onlined hemorriage, especially from the meaning entering and an arrange entering and an arrange entering and arrange entering ente on continued hemorrhage, especially from the mea-cateric vestels gross associated muscle wounds or hollars and strongland latertine. prolapsed and strangulated intestine.

In view of the high mortality of exploratory in view of the high mortality of exposurous the particular in these injuries the author stresses the monection of the connection of the co aparetrom) in these tajunes the author attends the heed of exact diagnosis and in this connection

emphasizes the importance of auscultation of the emposaures the importance of automatation of the abdomen for the presence or absence of peritalitic accounts for the presence of ansence of permantic sounds. Thus he adduces figures from his material. 243 sounds. Anus ne accourse aguies trom ans material showing that in the presence of lesions of the hollond snowing that in the presence of resions of the monor viscers peritaling was present in only 5 instances and absent in 84 while in the absence of bollow viscers] absent in o.; while in the absence of notion visceral lesions peritains was present in 64 instance and absent in only 1 instance. However, the believes absent in only I maisure However, he near that absence of borborygmi indicates thorough soil ing of the general peritoneal cavity

g or the sensing peritorical tarity

Rocardenography has been of little value in ab-Keentgenography mas been of little value in andominal wounds, especially with the type of machine dominal wounds, especially with the type of machine available in forward work. Of course it is apt to be available in forward work. Of course it is apic to be of value in the case of associated injuries which the or value in the case or associated injuries which the author believes to be of great importance over providing for their operative treatment concedental

viding for their operative treatment coincidents with or preceding the opening of the abdomen.

The authors do not believe that thoraccabdomic The authors do not coneve that thorsecondount also woulds are more grave than the purely abdominal variety but that in the presence elvice communications are also were the control of the commissancy vorting in the presence of perviction pleasing the results are apt to be poor. When the puctuons the results are apt to be poor when the fectum is intact they favor the use of the Murphy rectum is intact they involved the use of the attributed drip because with the usual venoclysis there is the onp occasio with the usual venocities there is interested anger of pulmonary edema resulting from the exdanger of pulmonary edema resulting from the ex-cessive administration of fluid into the vein after

When the large bowel is perforated the authors do When the large power is personated the authors do not subscribe to the dictum that exteriorization of not subscribe to the dictum that exteriorization of wounds of the colon, wherever located is the ac wounds of the coion, wherever societies is the accepted practice of at least, functional exclusion by epien piacine or at ions, innerional excussion of a proximal coloriony. Sixteen of the patients were colorion, and the patients were and a long and a long artists. a proximal coloriomy Sixteen of the patients were correction, with 5 deaths, and 57 by exteriorization, with 26 deaths. It is believed that routine orization, with 20 deaths at is believed that routine exteriorization of the right side of the colon is both extendination of the fifth side of the colon is both unnecessary and dangerous, and that suture is the fifth and a figure of the first many sums has the unnecessary and cangerous, and that suture is the simpler and safer procedure. This may even be the case in wounds of the splenic flexure where mobility that the safe of the splenic flexure where mobility that the safe of the splenic flexure where mobility that the safe of the splenic flexure where mobility that the safe of the case in wounds or the spience nexure where mount mation is often difficult and productive of shock. Of tration is often difficult and productive of shorts of course, these statements refer to young vigorous visions of the districtions. course, these statements refer to young victorous soldier patients at least, none of the deaths from soldier patients at least, none of the deaths from peritoritis in this series has followed surface of wounds pentonius in this series has tolkowed surface of wounds of the large gut. In fact in 1 case the wound of the intrapersoncal portion of the rectum was accom intrapersionest portion of the rectum was accompanied by multiple perforations of the small bond. paned or insurpre periorations of the amail power with three complete transections severe bleeding with three complete transcriping severe obecoming from the bowel and metentery, and eventration of some 18 inches of fleum, some 6 hours after wound some 18 inches or neum, some o nours after wound ing 3 et 2 feet of the ileum were resected and the ang yes y text of the neum were reserved and the rection was sutured (without colostomy) and the patient made a good recovery

literally wounds of the small intestine are the Naturally wounds of the annul intestine are the most numerous but they are relatively less neconstants. most numerous but tany are relatively in successful than the usual associated injuries (if one exclusion to the lines belongs and subsection). than the usual associated injuries (if one excluder injuries in one excluder kidneys and spices). In involvement of the liver Evineya and spicen) in fact, perforations seem to do well with single layered. tact, periorations seem to no went with single myerous affilier only in contrast to the large gut for which stuttes only in contrast to the large gut for which two layers are invariably employed. Drainage of the two is) era are invariantly employed. Drainage of the abdomen in these cases has little to recommend it. abdomen in these cases has fittle to recommend it is because blood, rather than intestinal contents is usually found in the peritoneal cavity. It has been the authors practice to drain the laparotomy round the authors practice to urain the saparotomy wound when there has been gross soiling and to drain the

peritoneum only when bile or feces in large quantity has contaminated it.

Kidney wounds are of leas concern at the forward station so long as the pedicle is not too severely involved when the pedicle is involved a nephrectomy may sometimes be required because of persistent hematuria.

The patient must remain in the field dressing station or the casualty cleaning station following laparotomy until his general condition warrants evacuation and the abdomen can be said to be fairly quiescent this usually involves to days or more. The danger of sitting patients up too soon after lanarotomy should always be remembered. The value of sulfadiasine (6 gm daily) in intravenous drip has already been stressed and results, as yet unpublished show sulfadiazine to be superior to penicillin in combating peritonitis. In the immediate postoperative period gastric suction and morphine are useful morphine (gr 1/4 every four hours) has always proved satisfactory as a sedative for the patient and his alimentary canal, and it can usually be discontinued as soon as the bowels act. This is rare before the fourth day, but it does not mean that an enema before this is always contraindicated. It may indeed be a helpful measure in a patient with an in jury of the small gut whose large bowel was loaded at the time of operation. An enema may likewise be useful as a preliminary measure before a rectal drip is started

As regards postoperative diet, it is, at first, fluid however, carried fluid charts have repeatedly shown that a pint or more of fluid per day is retained even with continuous suction. Nutrient fluids are there fore of use. Two hundred milligrams of ascorbic acid daily are given as well.

More than 50 per cent of the deaths occur from shock or hemorrhage within 48 hours. After this, the fate of the patient depends partly on the nature and multiplicity of his wounds and the interval between wounding and operation, the most important cause of death being pulmonary (bronchopneumonia pulmonary edema and embolism) Silent distention of the abdomen occurs guite frequently, but when not due to peritonitis it has not proved fatal in this series. Fluids other than plasma and glucose-saline solution have been employed—hypertonic saline solution for thorseosphominal wounds with severe laceration of the lung alkal for the patient with threatened anuria (a per cent or a per cent sodium bicarbonate) and blood for the anemia which so commonly becomes evident n the fifth to seventh day when dilution has followed the initial blood loss. Fresh blood, in this case is infinitely better than the stored variety

In the 210 cases of the authors material there was a mortality of 37 per cent, this figure closely paralleling that of other larger series quoted elsewhere. Disappointment in the results is most common in the first 14 hours after operation when the patient is described as dying of shock, and only an elucation of this condition is likely (in the view of the

authors) to make an appreciable difference is the mortality of abdominal surgery in the field.

JOHN W. BERGMAN, M.D.

De Waal, H. L. Wound Infection. Litebergh 11 J 1945 52 373

A knowledge of the fundamental physiological aspethological aspects of wounds will aid any suppoin his search for methods of promoting sound lealing. He should work in close to operation with his colleagues, the bacteriologist, physiologist, and a thologist and should concern himself as much with the study of infecting organisms and their effect or tissues as with the surgery and bedside treatment of wounds. The method of collection of material have wounds for bacterial investigation and the reschi is a series of cases are outlined and appraisal.

In both old and fresh wounds awabs should be taken both before and after saline lavation and se gical treatment. Prompt culture should be made for aerobic and anaerobic organisms in the respective swabs. Results from a series of 618 wounds to esamined showed (r) insignificant infection in iron wounds from o to 5 hours after injury (s) the proence of infection in fresh wounds similar to that found in old clinically infected wounds from 5 to \$ hours after injury, (3) infection by both bacteria and saprophytes in 88.8 per cent of the cases after 13 bours (4) a decrease of organisms in fresh would after cleansing and surgery, (5) that clinically misfected wounds already under treatment contained chiefly nonpathogens (6 and 7) a decrease in rospathogens but a proportionate increase in tissue is vaders particularly hemolytic streptococci, in the tissue swab after saline cleansing as compared to the findings in the swab taken before cleaning (comprehemsive swab) and (8) that subculture from primary fluid cultures gives an erroneous idea of the propor tions of organisms.

It is emphasized that it is the invading organism on the midding edge and in the deep tisses of a infected lesion which must be discovered and deh with rather than the organisma in the pas on its surface. This peccasitates the two swals, the second one taken after the pus has been removed with meticulous regard for the delicate healing tissue. But circularly the studies in these cases aboved that its staphylococcus albus, saprophytes, and other organisms were proportionately more prevalent in setting taken before lavage, while the hemolytic surspector us was more prevalent in waste taken after lavage, and the staphylococcus progenes was found in relief with the staphylococcus progenes was found in relief withey the sam proportionately.

It is postulated from bervation that the equiums in the deep theore prepare the exceptible issues for later Invasion by less pathogenic but one numerous invaders the latter which provides the latter which the part of the hardy but more pathogenic organization the provides and the provides t

discovered and proper therapeutic methods carried PAULE B CHARK, M.D.

# Beecher II K.: Anesthesis for Men Wounded in

Progress in the field of anesthesia in the last 30 rears has made possible many of the advances of the author in this article attempts to suft surgery the author in this arrive attempts to an thirt the anothesis procedures found to be practic. able in warfare and necessary for the best military surgery intravenous anesthesia with socium pentothal, which is admirably suited to wartime Intravenous anesthesia with sodium pentoting, which is admirably suited to various surgery has had its first significant trial in this war. The author discusses its use on the basis of the ex penences in the Mediterranean Theater of Opera

A number of factors are important in the choice of A number of factors are important in the choice of anothetic agents. Simple durable equipment is esanerthetic agents. Simple durable equipment is established because of the need for rapid mobilization The problems of supply soon convince an anesthe list that the simplest agents such as other sodium the that the simplest agents such as einer sommen pentothal, and proceine hydrochloride are adequate for the forward some Pensonnel problems are in for the forward some sersonner proposed are one portant also as shown by the fact that one third of portant also as anown by the fact that one third of three months or less of special training

The preoperative preparation of patients has been examined that the preparation of patients has been examined the subject of t frequently discussed elsewhere. lives seriously wounded men need little prenner Morphine is to be avoided except for the relief of severe pain, since with a poor peri for one remer of severe pain, since with a poor periodic direction the morphine which has been reviously administered may or may not have been Shorbed from subcutaneous deposits and with re successful and later vasodilatation the morphise may be rapidly taken up into the blood and poison ing occur Attopine is important to cut down secre from when ether and pentothal anothers are used The such that and personal anothers in the such that in the such that in the such that it is the such that describe for intracranial manifolacial, thorace and shedominal surgery and in cases in which the pa kent a position makes it difficult to maintain an ATTER OF THE WHITE THE CONTROL OF THE WHITE THE WHI So. The routine use of the bronchotcope is underst because the trachen can be kept clean by fre quent apprations with a catheter. The insertion of quent apprations with a caineter inc macrison on which is mediately prolonged deep anotheria with it understable or deepening of the anotherical way. water is undestrable or deepening of the anchoracae such possible harm to the patient at the end of a trying operation. If topical Austheria is used and the carriers are the control of the patient is used and the carriers are the carriers. tying operation. It topics: accounts a trace and the patient vomits on recovery from the seneral about our the patient vomits on recovery from the general spacethetic, aspiration of the vomitus is almost cer

Ethyl chloride and chloroform are little used and cyclopropane and ethylene have not been issued to O'COPIOPANE and ethylene nave not been assure to the American Army in this theater. Nitrons oxide is needed for a feed of the state of description of the state o the American Army in this theater. Altrons observe in metal for minor surgical procedures (painful dressing channes). A manufacture of a metal heater. changes) to supplement other forms of anesthesia (a the industrial and to induce other anesthesia As the induction of ether is not unpleasant the use

of nitrous oxide is not indupensable. Ether is the of nitrous oxide is not monspensative. Extrer is the choice for the seriously mounded. If surgery is to be caotee for the seriously rounded. It surgery is to be undertaken in patients in shock or impending shock. undertaken in patients in anock or impending anock, ether is the best tolerated anesthetic agent. Ether ener is the pest tolerated anesthetic agent. Euler provides practically all the anesthesis for major provides practically an the ancouncing our major cases in field hospitals. It was used too little at trace in meto nospitan. At was used too neder an first, but its use has increased in the surgically in portant group of wounds of the abdomen and thorax and in compound femur fractures.

In September 1943 deaths from sodium pento-In September 1943 Geaths from southum Pentor that were so common that the question of abandon that were so common that the question of anandon ing this agent was raised. Two correctable factors age to agent was taken the causes of these deaths were found present when the causes of these deaths were examined (a) its frequent use by completely trere examined (a) its frequent use by completely inexperienced individuals and (b) its use in case in inexperienced individuals and (0) its use in cases in which it was contraindicated. The advantages of which it was contraindicated. The advantages of sodium pentothal—its compactness and simple equipment the smoothness of induction the prompt equipment the smoothness of mouction the prompt waskening of the patient, the infrequent unpleasant after effects and the number of cases an inexpen atter energy and the number of cases an incapera-enced man can get by with have led to the decinon to continue its use and at the same time take measures to correct (a) and (b) The disadvan take measures to correct (a) and (b). The conservant tages of sodium pentothal are the facts that over donage is often difficult to overcome that its use is a constant to the constant and that the constant to the constant tages and that douge is often ormein to oversome that its use is incompatible with certain types of injuries and that incompatible with certain types of injuries and mai the fatal dosage varies widely in different individuals

penals cosace varies whosey in unicirem manyamase.

Pentothal destroys the senativity of the respirarentothat destroys the sensitivity of the respiratory center to its normal stimulus carbon dioxide tory center to its normal stimulus carbon dioxide

To maintain respiration a shift is made from the to maintain teapmation a sum to made from the normal driving action of carbon dioxide on the normal driving action of caroun distance on the respiratory center to the action of anorma on the respiratory center to the action of anoma on the chemoreceptors the carotid mechanisms in the neek Anoria stimulates respiranon under full peniohal anesthesia as well as under light anesthesia. When encourcing as wen as unusering a succession of the respiratory stimulation due to another is wrongly respiratory summission due to snown is wrongy interpreted and more penfothal has been given interpreted and more pentotrat has been siven deaths have probably resulted. In operations or condition one half hour consequences about the admitstance of the condition of the destin nave prooxoty tenuted in operations extered with pentothal and then the character of the teren with pentionial and then the character of the respiration is a helpful guide to the depth of another aspiration is a neutral gener to the veptus of ancastic size. The use of carbon dioxide to atmulate respira na. Inc use of carbon dioxage to summing e respiration depressed by pentothal is contraindicated because under such circumstances it causes de pression

The use of a 2 5 per cent solution of pentothal the the use of a 2 5 per cent solution of pentiums are routine administration of oxygen and frequent touring automorphisms of oxygen and irrequent observations of the pulse and blood pressure consti observations of the pulse and plood pressure consultate the acceptable practice in operations required tute the acceptance purcture in operations requiring from one half to three fourths of an hour. A shift to tom one mail to three lourns of an Bour A shift to ether is recommended if the operation requires more einer is recommended it the operation requires more time. The preoperative use of morphine may or may and the preoperative use of morphine may or may on the resorted to it may cut down the total quantity of pentothal needed but the author sugarity of the surface of the sur quantity of pentornal needed out the author suggests the supplemental use of 50 per cent introdu Sents the supplemental use of 50 per cent nitrous oxide and 50 per cent oxygen as a better means of accomplishing this end (tropine in a dose of 1/200 gr one of 1/200 per cent nitravenously just prior to another use of 1/200 commended to cut down varial reflexes. If larvin gr given intravenously four prior to ancestorism in recommended to cut down versal reflectes. If larry in the state of the recommended to cut down vegas renexes it tarys recommended to cut down vegas renexes it tarys are recommended to cut down vegas renexes it tarys recommended to cut down vegas recommended to cut down vegas renexes it tarys recommended to cut down vegas renexes it tarys recommended to cut down vegas renexes it tarys recommended to cut down vegas recommended to cut down vegas renexes recommended to cut down vegas intravenously is recommended

Pentothal is contraindicated when (a) the nations is suffering from a mornhine overdose. (b) when shock is present or anticipated (c) when cervical inflammation is present (inflammation in the region of the carotid bodies and sinuses causes sensitivation of the reflexes and may lead to sudden death) and (d) in the presence of was gangrene (since these toxins produce severe circulatory damage)

The use of pentothal is manally unwise (a) when the operative position interferes with the sirway (b) in intracranial survey because the operations are long and bloody, and the pentothal may came sudden resouratory depression and aports and (c)

in severe burns.

Its chief use in military medicine has been in short procedures for which relaxation is not needed

and the men are in good condition.

Local and regional anesthesia with procaine by drochloride and topical anesthesia with pontocaine or cocaine have been used for neurosurgical, maxillofacial, and minor surgical procedures.

Spinal anesthesia is usually a poor choice for recently wounded men, because their precarious circulation rapidly deteriorates under it. Its chief use is for emergency appendectomies and conditions unrelated to warfare.

Anesthesia was given in 15,025 cases, 1,628 (10.4%) being classified as abdominal injuries 1 tos (0.4%) as thoracic injuries with nieural imalment. and to8 (1.8%) as thoracoundning in

Of the men listed in the files of this thester as specialists in anesthesia, only 10 per cent were con tified by the Board so per cent had only the species sia training of an intermalp, and 15 per cent had from one to three months of special training is secthesia. The total number of physicians was so small that nume anothetists and a few come men were used under close supervision

Whenever possible the ablest anesthetists are sestened to combat sones as there the demands for native intelligence, judement, resourcefalses, and technical ability are greatest. In some instance men of unusual ability were used to train ansthetists to be sent to forward areas.

By accepting the limitations of sodium periods. that is, avoiding its use in badly wounded men and for providing relaxation, and using it for short pocedures in men in good condition a great reduction in the death rate which has been attributed to it im been possible. At the same time, its use his n-creased. Thus, sodium pentothal, together with ether and procuine, takes its place as one of the three most important anesthetic agents for me in military medicine and surgery

R. R. Bicklow M.D.

# PHYSICOCHEMICAL METHODS IN SURGERY

Her L. G : The Development of Roentgen Diag

This article is an extensive concentrated review of the development of roentgen diagnosis prominence is given to the role which contrast promised to sive the solution of the applicability necus pusyes in interior extensing the appureaming of this method. Two anatomical drawings of the Special or one mercane, two anatomical diagraphs of the human body duplay the organs made accessible to range transplant on and give the name mode of a ray cammation and the year that x ray examination annumeration, and the year that a ray community are first used for the diagnosis of disease of each of these organs. One plate shows contrast media. denier than itsue, the other shows media which are less dense than the surrounding tissue. A bibliog nay dense man one surrounding tosue. A ordinar raphy of 326 references helps to establish historical priorities.

A table enumerates 44 groups of anatomical parts A table enumerates as givens or anacounter parts and disease processes to which roentgen diagnosts is perticularly applicable Several conditions in which recurrency approache occess continues in minutes at ray diagnosis is of no avail are mentioned. Cer tan conditions can be diagnosed by other means

at an earlier stage in others the reverse is the case The absence of roentgen findings may be signifi ant in some conditions but meaningless in others and on the other hand the presence of x ray find lags may definitely indicate disease in some cases whereas in others they may not allow such con Cusions. (Examples of each of these conditions are CUIDDE (Examples of each of these conditions are given). The correct and incorrect use of the terms typical inding, and characteristic finding in discussed. All these facts and problems show that typical finding and characteristic mining and discussed All these facts and problems show that only the correlation with chinical findings and the way the contention with cumical minings and one knowledge of disease aspects make it possible for one to a seeing a state of a seeing as the content of a se the correct degree of emphasis with to arrive at the correct degree of emphasis with which a given x ray finding should be appraised As a seneral rule, a negative roontgen examination is much less agnificant than a positive one the most important exception occurring in chronic pul

Al far as the future of roentgen diagnosis is con cerned one may safely assume that practically no competing diagnostic procedure will replace this method. Usually the institution of other methods of the casalination of the c estimation, e.g., gastroscopy has given a further stimulus to roentgenology

The roenigen examination of the liver pancreas ad splen has not yet been perfected this presents n inviting goal to the ambitions radiologut. Body ction and soft thate toentgenography require further improvement. The popularization of rou the change has a regular intervals, not only of and estimations at regular interview and volvy with echost but also of the stomach (at least in case) with echication of control history of course with achierhydria and a familial instery of Perinc with achieving and a laminal matery of permitted and a laminal matery of permitted for the social importance of meta-adaptive of initial factors in to roentgenology The detection of initial lesions is

Great progress in diagnostic roentgenology is to be expected when electronic image amplification will expected when electronic image amplification will allow the production of incomparably brighter fluoroscopic pictures with negligably sugarifications of rays. Then motion and multiple pro-Jection studies will become a commonly used method and roonigen cinematography will no longer en and toenigen cinematography will no longer en Counter its present difficulties. This may contribute to a shift of nonligenological interest from anatomical to a court or recurgenous cast interest from anatomical festions to abnormalities in organ physiology and minor changes in the function of organs.

Arbuckle, R. K. Shelden C. H. and Pudenz, R. H.: Pantopaque Alyelography; Correlation of the rantopaque hyprography; curronnou or me Roentgenological and Neurological Findings.

The authors have analyzed 100 consecutive cases with a provinonal clinical diagnosis of protruded interventebral disc, all in naval personnel, of whom interventedrat due, an in navat personner, or whom any elegraphy 87 were subjected to pantopaque myeiography. Most of the men were between 20 and 30 years of ages and 50 per cent of them had had symptoms for age and 50 per cent of them had had a symptoms for only 6 months or less and 70 per cent for not more only o months of the commonest types of traums than one year. Inc commonest types or trauma associated by the patient with onset of the sympassociated by the patient with onset of the symp-toms were the lifting of heavy objects falls or slip-ping on wet surfaces without isiling

Preliminary filming of the lumbosacral area Preliminary mining or the immovancial area showed a list of the lumbar vertebrae either toward Move a list of the number vertexus created toward or away from the aide of the lesion in 47 cases loss of or away more the auto or the resident in 4/ cases or the normal lumbar lordotic curve in 27 cases and narrowing of the intervertebral cartilage space in narrowing of the intervented as Cartinage space in only 11 cases. However bony proliferation and nar omy is case. However your promuration and nar rowing of the cartilage space concerned were prescont, almost without exception in those patients who

The injection of 3 cc. of pantopaque in the lower lamber region was done usually with the patient prone on the tilting fluoroscope. Defects, even par prone on the titing moroscope. Detects even par tial obliteration of an axillary pouch or alight cleva the contention of all extracty pourse of engine cieva tion of a nerve electre, were searched for both with tion to a nerve sceepe were scattered for both with only cephalad and caudad, and spot films were on howing cepnated and caudad, and spot mais were made with the patient in the prone or even in the made with the patient in the prone or even in the oblique, position. Lateral views gave no additional in formation and were abandoned. At the conclusion

tormation and were acandoned. At the conclusion of the examination, pantopaque was pooled at the tip of the past and in 70 per cent of the oil was removed. With example, the time for the oil was removed. With example, the time for the main and the conclusion of the oil was removed. soont to bet cent of the whole myelographic properience the time for the whole mycographic procedure totaled 20 minutes. The authors observed ceture totaled to minutes are authors of some one of the state of the no toxic manuestations or signs or root unitation and no more headache was complained of than after

nutine lumber puncture
An operation was performed in 13 cases of this An operation was personned in 13 cases of this cases myelography was unsuccessful as Eroup of 5 cases in yeography was unnutreased octained assured the sacrates in which mye

lography was performed after successful opaque injection, the procedure was diagnostic of two protruded duscs in each of a patients diagnostic or questionably so of a single protruded disc in 54 cases of a disc and tumor in a case and of a tumor alone in 4 more cases-all proved at operation. Three more cases had clinical and myelographic evi dence of protruded disc but were not operated upon another a had positive myelograms but were nega tive at operation 7 were negative at myelography but showed a protruded disc at operation, and o more which were negative myelographically were not operated upon. All but I of the 81 protruded discs found were caudal to the fourth lumbar verte bra whereas of the 5 tumors encountered 4 were above the fourth lumbar and below the eleventh dorsal vertebra.

The authors were concerned particularly with the group of 7 cases which were negative at myelog raphy but revealed a protruded disk at operation, and found that all of these cases had a narrow subarachnoid space measuring 6 mm or less in diam eter as did also the 10 cases in which myelography was only questionably posit ve. On the other hand, there was operative confirmation of the roentren findings in all of the cases with a subarachnoid space wider than 16 mm. Even with a narrow substachnord space, midline or large posterolateral protrusion offered no myelographic difficulties. Failure to demonstrate the lesion occurred in patients having both a narrow subarachnoid space and a posterolateral protrusion too small to encroach either on the narrow column of pantopaque or on the adjacent nerve aleeve or pouch. No correlation existed be tween the interpedicular and subarachnoid widths.

The authors conclude (1) that roentgenograms of the lumbosacral spine without the aid of myedge raphy are of little definite help in the diagnosis of protruded intervertebral diacs (2) that pantopaging is a satisfactory medium for myelography because of the ample contrast, its lack of infrasing properties, low viscosity, and case of removal (3) that myelography should be carried out as an aki in Juagnosis and localization of single or multiple protruded discs, and in differentiating them from tumors and (4) that a negative myelogram in a patient whose substachnoid space measures less than 16 mm, does not preclude the presence of a protruded disc.

LILIAN DONALDSON M.D.

Schnitter M T and Booth G T: Pantopaque Myelography for Protruded Discs of the Lumbar Spine. Redislery 045, 45, 370.

Pantopaque, a radiopaque mixture of isomeric ethyl catera having a provisional principle constitent of ethyl idotophenylundecylate, and containing 30.5 per cent of iodine in firm organic combination was used astrifactorily by the authors for dagnostic myclography in 100 patients of a total of 313 with low back pain who were admitted to the surjical service of Bushnell General Hospital, Brigham City Utah.

Thirty of these 100 cases showed myelographic evidence of protruded intervertebral disc, matter in 3 patients, which was verified at operation. In other 5 cases, negative at myelography shorel protruded discs at operation, and a cases positive myelographically proved negative at openti-These 2 "false positives occurred early a the series and the visualized defect reported at first b evidence of an extradural mass, was on review for d to be due to the needles being left in place at the time of myelography an error of interpretation which was later avoided. Thirty-seven was the tree number of patients operated upon. A review of the premyelographic roentgenograms of the lumber spine in the 35 cases in which a protraded discusfound at operation showed a definite parrowing of the intervertebral disc in only 7 cases.

The technique of the procedure is recorded in tail. In more than 80 per cent of the case subjects to pantopaque myelography, over 80 per cent of the injected oil was removed at the end of the procedure. The authors stress the desirability of avoiding the auspected site of lesion as the site of injectors is cause injection and subsequent removal may be more difficult, the needle may strike the issue as enhance or distort it, or the needle itself may create defect as resorted.

A reaction occurred in a case in this series of or, manifested by symptoms of meningiams as elevation of the cell count, and in a matiance by its crease in the total protein in the spinal find, by rapid recovery occurred without sequelae. The degree of reaction, as gauged by change in the spinal find, by off the country of the country

The authors conclude that the verification of its presence of a protruded intervertebral does or obtained and the presence of a protruded intervertebral does not suppose the constitute of the constitution of a multiplicity of the lections make the use of myelography with parapaque (which they prefet to air or lupicolo) about papers (which they prefet to air or lupicolo) arising in indeterminate cases of low back pain with sential the constitution of the constitu

Gershon-Cohen J: Internal Derangement of the Knes Jointy The Disgnostic Scope of Soft Tesus Roentigen Examinations and the Vaccus Technique Demonstration of the Menicl. J. J. Reself, 1945, 54–335.

The value of the roentgen examination of the set timues and menuci of the knee has repeatedly been accessed.

It is not necessary to resort to special technique. The addition to the routine examination of the izer in the anterposterior and lateral views of the lore tudinal view of the patella and of blateral views the mensor will suffice. If any absormal soding are disclosed, further obluque and so-called later condylar views may be supplemented.

It is important that for the viewing of each room genogram one be supplied with a source of light which has wide variable intensities and that its

field of illumination can be regulated in size and need of immunication can be regulated in size and supplied to optimize visualization of the soft atructure

The technique employed by the author for blast the remainder employed by the author for our memory of the memory for briefly eral antenupolacitor views of the menney is observed in the interpretation of the findings, no GENCIDEU IN INC INTERPRETATION OF THE ANGUNES, IN againgence is a traction to tricking marking or up feet of the mention since they may occup under nor an advance of the man occup under nor the man of the man occupance nal conditions Only the nonvine occur once our menocus carries diagnostic rengili because provide con carries diagnostic rengili because provide con carries disconstitution of the carries of second contract to the carries o mentang carries outgoodile weight occasive synovial fast in the slightest excess makes demonstration of dup in the suggest excess makes demonstration to the mentages impossible. It must be destinated the makes and the the menucus impossione at must be menuoused that even with the best techniques, the Aboverer that even with the occi techniques, the mentions can be demonstrated in not more merna menacus can be demonstrated in not more than 80 Per cent and the external memoria in not man so per cent and the external memoria in 100 per cent of all the cases. If therefore more than 30 per cent of an the cases to the members cannot be demonstrated in either kness. the menicus cannot be demonstrated in either knee both; it is presumed that the patient falls into the small so per cent group in which the internal incus-cus cannot be demonstrated and thus the follows: Kanu 30 per cent group in which the internal means-cent cannot be demonstrated and thus the findings have no clinical value.

The finding of silght excess Prooved fluid in an actively injured knee evidenced by a failure to dem activity injuried saice evidenced by a familie to decided and analysis of the medical suggests abnormal changes are assumed by the analysis of Ometrate the memorus suggests abnormal coaped especially if the opposite side appears normal may be an armal fracture on Lossaning of the after the coaped and the coa expensity if the opposite side appears normal. Annual flag that a section of the swelling of the stratch than the same flag that the swelling of the stratch than the same flag that the term to a membrons of a streaming or the tional countries of a streaming or the tional countries of the demonstration of the membrons on a stream to the demonstration of the membrons on a stream to the countries of the tional countries of tional countries of the tional countries of the tional CEAL INFORMER TESTITUTES FROM a APPRILL. UNCERSIONALLY
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The suther discusses in detail the clinical sympotomatology and the significance of the counter symposis for the significance of the received find commonogy and the algundance of the roomigen and the above method in internal derangement of the contract of t ones by the stoop method in internst derivativement the knee foint loose bodier sprain or rupter of the knee foint some bodier sprain or rupter of of the fine joint toose bodies sprain or rupture of the libial collisional ligament sprain or rupture of crais of the menne, learners persaturals burntus. The conclusion is reached that the conclusion is reached that the complete study of the soft strange of the known in combination with of the concussion is reached that the roomisen study of the soft this way of the knee in conjunction with a manual is of definite numbers. or the soft that of the knee in conjunction with the menuc is of definite practical to the menuc is of definite practical to the menuc is of definite practical to the menuc is of the menuc i

Garland, L. II.; \ Ray Burns from Fluoroscopy to the Gastrointestinal Tract. J Am 1/ Air, 104

Knowledge of the effects of x rays on the pattern as not kept pace with the increased mental make in hosts military and industrial by as not sept pace with the increased roem sensors, call work done in both military and industrial hosat NOIR done in both multary and industrial liberary, the newer machines may be even more dan Since the intensity Group than the nombockproof Since the intention of the control of octions that the nonmockphoot some the institute of x-rays varies inversely with the square of the state of the same the foliage of the nations the de trays varies inversely with the square of the patient the table is to the patient the France the Possibility of skin damage

tracts too possibility of sein courses. For adequate Protection, the following factors and an amount of the following factors are all the following factors and the factors are present that are considerable for the factors are considerable for the factors and the factors are considerable for the factors are considerable for the factors and the factors are considerable for the factors and the factors are considerable for the factors and the factors are considerable for the factors are considerable for the factors and the factors are considerable for the factors are considerable for the factors and the factors are considerable for the factors are considerable for the factors and the factors are considerable for the factors and the factors are considerable for the factor A for adequate protection, the lowering lands will also write in mind adequate distance reason much mind and supplied that are reason fluorescopic. angua be bome in mind adequate distance massing field and as minimal discovering small discretionic examination time and votage for minimum period and a minimum fluoroscopic examination time as possible and a minimum fluoroscopic examination time approximation to the materials. the state of the s long periods of fractures under fluoroscopic contractor.

Such procedure frequently

results in permanent akin damage both to the patient an operor

Four cases of x ray burns that resulted from pro-Four cases of x ray burns that resulted from pro-posed exposure during the course of sutroutestinal examinations are reported. The author streams that x ray humas resulting mineractions from point that x ray burns resulting unrequestry from Point that x ray out testiting unneversarily from the avoided by using a 22fe distance HUODECOPY CAN be avoided by using a sale distance of allowing medical (from 12 to 18 Detreen one tune and the patient (from 12 to 1 a haam size not larger than 6 armans inches James a tecam size not targer than a square mones no more chan 3 minutes of exposure per examination, and no more size of exposure per examination, and no than 3 minutes of exposure per examination, such an administration per month. Above all HODE USE 4 SUCH CARBURGHOUS PER MORIEL ADVICES.

Support adaptation (at least to minute) of the ex Diviser anaposation (at reast to minutes) of the minutes of the mi

December 31 1943 a series of 91 cases of primary of the central nervous 132(em.) matignant neoposams of the central nervous system followed the pay Of these 60 cases have been controlled the control of the c by noestgen therapy. Of these to cases have been salve and rell or alive and rell save for residual. symptoms

fapinas In the beginning a more conservative procedure In the beginning a more conservative procedure which were divided among multiple ports and given a source of some standard from some support and given to some support and given to some support and given to some support support and given to some support s which were divided among multiple ports and given total done was rated from 10,000 to 15,000 r (in arr). Then factors emulayed were removed to 15,000 r (in arr). total doze was raised from 10,000 to 15,000 f (in air).

The factors employed were founded by 10,000 f (in air). I me alector tempored were openseen they or 2.0 mm of copper light value layer with Thomsess filter mm of copper man value tayer with a horacus interat 50 cm. local skin distance the initial core was 100 r per day to each of two fields. If no significant

TABLE 1 - THE SURVIVAL RATE IN RE

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TABLE II - SURVIVAL AS BELATED TO THE TYPE OF TUMOR

Type of temor	No. of	Protoperative and posterradiation serviced			
Table & compos		Mari-	Mind-	Ачельня	
(A) Clioblestoms multiforms Alive and well		47 🖦	, ==	112	
Aires with residual exampleme			-	п 🖦	
Affre with marked symptoms		-	-	n =	
Dead	20	64 500	mo	14 J MO.	
(B) Astrocytema Alere and well		64 200	- Boo	446000	
Alive with residual symptoms	3	=	-	# ==	
Dead	-	44 ===	<b>300</b>	7 =4.	
Astrobiostoms. Abve and moderately well		_	-	4	
Dead	$\Box$		-	٠ =	
(C) Ependymorea Alive and well		40 <b>300</b>	7 ==0	n) t we	
Dead			-	9 20	
Medulioblestone Airre and well	1	<b>₽</b>	D ==	= =	
Allive with residual symptoms		_			
Dead	[]	7 ==	6 200	66 po	

reaction developed within from 8 to 10 days the dose was increased to 150 r per field. The tumor dose approximated oo per cent of the total roentgers in air for the frontal lobe lesions 83 per cent for the temporal and parietal leasons and 72 per cent (76.5 per cent for children) for the occipital lesions survival rate in relation to the tumor dose is shown in Table L

The scalp tolerated the amount of radiation given very well. Regrowth of hair has been excellent even after 15 coo r

The mental state likewise, improved considerably co-ordination returned, and, although some aphasia or staria remained the mind cleared. In not a few of the cases the formerly-held responsible positions in society could be resumed.

The survival period depended to a certain extent on the type of tumor This is shown in Table II.

As may be seen, globlastoms multiforme had an almost reciprocally low proportion of survivors as compared with astrocytoma. Tumor doses in excess of 7 500 r will be required.

As a whole, definite clinical improvement was effected by roentren therapy of the malignant primary neoplasms of the brain and brain stem. No late degenerative changes have been observed which could be attributed to the irradiation.

T Larcons, M.D.

Fairchlid, G. C., and Shorter A.: Direct Irradiates of Cancer of the Stomach and Other Vhora Exposed Temporarily at Operation, Land. Load, 1945 140: 51

The authors report that the end-results of cir cinoma of the stomach are poor. In their emerience the percentage of 5 year cures has been from 1 to per cent and they believe that in most instance for ure is due to (1) late diagnoses of lesions that an isoperable. (a) incomplete surgery and (a) irradation Results with external irradiation have been pour cause of the necessity of avoiding injury of neighbor ing organs and the radioresistance of sastric temor Contact therapy covers small areas, at a doot of more than I cm., with little effect. Unequal distribution of irradiation is one of the faults of rados see implantation. The use of intracavitation irredution. as advocated by Livingston and Pack, has been in ited because of the fact that the tolerance don he not been established

In view of the poor results which have been tained in the treatment of gastric cardnoons, a seapproach -direct irradiation at the time of supply -to improve the percentage of 5 year cars, we deemed feasible. The advantage of this method s that neighboring organs are protected, also, the ismor dose may be high because radiation therapsis will not be worried by akin effects such as are are following external irradiation.

The authors used this method of irradiance as only on mustric lesions but also on cancers of the esophagus and of the colon. In all instances then was at the time of surgery, consultation between the surgeon the radiation therapist, the pathologist, and the anesthetist as to the best form of themps In radiation therapy, a units were used simplicators ly (one anteroposteriorly, directly to the lesion, and the other posteroanteriorly through the skm to the lesion) Farlier in the series, only I unit was used It was believed that with a units a greater and more effective tumor dose could be delivered at one tux and that it would not be necessary to give supply mentary external bradiation, as had been required when only I unit of radiation therapy was used

Fifteen patients were treated in the manner reported viz., 9 with cancer of the stomach, 5 with cancer of the esophagua, a with cancer of the coles, and I with cancer of the pancross. The tumor dow was 1,300 roentgens Of the 15 cases, 6 were palliative. No unusual postoperative radiation conplication has been observed.

The authors are of the opinion that this method is of value and that it is a reasonable approach to the problem of visceral carcinoma.

MAURICE D SUCK, MD

Goin, L. S., and Hoffman, E. F : Contact Rombre Therapy in Cancer of the Bladder As. Rende 945, 54 392

The authors have now modified the method of treatment of carcinoma of the bladder on which ther reported in 1940 and which consisted in marsuriality

tion of the bladder with subsequent contact irradia tion of the tumor by low voltage roentgen rays and are using instead suprapubic cystotomy under spinal anesthesia and reduction of the tumor to its bese by fulgeration, followed by direct irradiation of the tumor with one or two reopenings of the bladder for further irradiation.

The apparatus employed is a Philips-Metalix operating at 50 kv., constant potential, and 2 ms. with a shock proof tube 23 inches long and slightly less than 2 inches in diameter at its active end anode is 2 cm from the surface of the tube and the roentgen afflux is 1 143 per minute with a filter of 1 mm. of aluminum. This construction permits easy introduction of the tube, encased in a sterile stock inette and rubber sheath, through the cystotomy wound. The target surface distance used is 22 mm and a first dose of 5,000 r in air is administered to the base of the tumor. Most cases treated have had two cystotomies about 1 week apart, and have received a total dose of 10 000 r Only moderate sloughing followed the treatments and no severe hemorrhage, perforation or fistula formation resulted, nor was there any primary mortality

Treatment was limited to tumors not more than 3 cm. in diameter involving the trigone of the bladder since the alternative in trigone tumors is total cystectomy with its high primary and secondary mortality. The 3 cm. limit is considered important since greater size of the tumor would necessitate the use of several circular fields with either resultant dosage overlap or failure to include some small ir regular areas in the treatment. For neoplasm of the vault or lateral walls of the bladder the authors prefer local resection if possible. They rationalize the use of this combined surgical and radiation procedure as follows

Cancer of the bladder tends to metastasize rather late in its course and is often fairly radiosensitive and by contact irradiation a large dose can be ad ministered to the tumor base without irreparable miury to the adjacent tissues. It is estimated that with a circular field 3 cm. in diameter and factors the same as specified previously the dose at a depth of I can is only 32 per cent of the surface dose, and at 4

cm only 3 6 per cent.

The authors treated a series of 31 trigone tumors in this manner of which 13 were papillary and 18 infiltrating carcinomas, ranging from grades 1 to 4 with grade 3 predominating. The first 4 cases were subjected to marsupialization and received 10 or 11 treatments each at weekly intervals up to a maximum of about 18 000 r in air in 22 days. The other cases were subjected to cystotomy and of these 15 received about 10 000 r and some of the others less the minimum being 5 148 r which were received in a ample treatment. In addition to the original biopsy, a second biopsy was done in 20 cases at the final treatment and no cancer cells were found in 13 of

survey of the results of this 5 year study showed 10 patients dead of cancer o of them within the

first year of treatment and r after a years. Two others are dead but they presented no evidence of cancer at postmortem examination. Of the 10 survivors 3 have so far lived 5 years another 3 for four years 5 have lived 3 years, and the rest from 1 to 2 Vest

The authors have compared their results with those obtained elsewhere by total cystectomy radon seed implantation, and high voltage external ir radiation and believe them to be at least as good as those obtained so far by these other methods. Fur ther in view of the low primary and secondary mortality in their series they consider the method of contact irradiation preferable to total cystectomy for trigone tumors. LILIAN DONALDSON M D

Borak, J. and Taylor H. K.: Beneficial Effects of Roentgen Therapy in Advanced Cases of Rheu matold Arthritis; Preliminary Report. Ra diology 1945 45 377

A number of investigators have reported favorable results from roentgen therapy of various forms of arthritis such as gonorrheal arthritis tuberculosis gout osteoarthritis and hypertrophic spondylar thritis. However in the rheumatoid (atrophic, proliferative) type of arthritis roentgen therapy has been regarded as less satisfactors

The authors have again studied this subject and during the past two years have treated 60 patients with advanced rheumatoid arthritis by means of roentgen rays these patients had failed to respond to the usually accepted methods of gold therapy vaccines physiotherapy, surgery, or any other method. Ten patients, with a total of 85 joints af fected, were selected for a critical study. The cases fected, were selected for a critical study are tabularly arranged attention being given to the following factors age, sex, duration of the ducase in years previous therapy present roentgen therapy (joints involved, stage and dose) and the results obtained.

Rheumstold arthritis is divided-mainly on the been of the degree of impairment of the mobilityinto 3 stages first stage, in which pain and soft tesue swelling restrict the active mobility of the joint al though passively it can be moved through its full range second stage, in which the mobility is re-stricted both actively and pessively to a varying degree and third stage in which there is no motion at all

Roentgenographically, in the first stage the mint space is normal although there may be a swelling of the periarticular tissues and some decalcification of the bones in the second stage there is usually a narrowing of the joint space, and sometimes destruc tion of the subchondral adjacent hone and in the third stage there may be complete ankylosus.

Pathologically in the first stage the cartilage may appear nearly or quite normal and the only visible change may be in the synovial membrane the second stage is characterized by the formation of granulomatous tissue and the third stage is marked by destruction of the cartilages and their replacement

either by fibrotic strands or osteoid tusme until complete ankylosis results.

The roentgen dose is gauged as follows for in flammatory edema, from yo to row in session for chronic inflammation, from see to 300 r in x to 3 sessions for hyperplana, from 800 to x for r in x to 3 sessions for hyperplana, from 800 to x for r in about 3 weeks and for granulomatious tissue, from x root to 1 600 r in about 3 weeks. In the series mentioned the majority of patients received from 800 to 1 600 r. The factors were sook w 0.5 mm of copperplus 10 mm of aluminum, 2 mm. 30 cm. distance, H V L. of 0.9 mm. of aluminum. Each port was treated three times a week, some foints being crossafred through 2 or 3 ports at each session. In multiple joints two joints were treated alternately so that

treatment was given daily

The results were good in most cases. Relief of the
local symptoms alleviation of pain, and even some
increase in mobility were noted.

T LEUCUTIA, M D

### MISCELLANEOUS

Hinkel C. L.: The Entrance of Pantopaque into the Venous System during Myelography Am J Recode 1945 54 230.

Pantopaque used as a contrast medium in myelog raphy is a valuable diagnostic aid. It contains 30 5 per cent lodine and up to the present has given the

A case is reported wherein some of this wholize was seen entering the neighboring woos system during the course of impelography. A consists as very of the body over a 2 month percel tablet as very of the body over a 2 month percel tablet as very any evidence of the or any other shoomstry. The patient showed a low grade temperature is the patient showed a live grade temperature days, which subsided dwhile count for the sent to days, which subsided dwhile count for the sent to days, which subsided dwhile count for the sent to force the sent to forc

podine.

Pantopaque is not intended for intravences or, and up to the present time no case of this kind has been reported. This case was reported as a crisisty rather than as a complication. Little a known of the hydrolysis, breakdown, and excretion of pantagage. Studies are still beine made by many investigation.

How the medium got into the venoes system is of clear to the author. It is thought that the vost may have been injured by the spinal needle and the patient coughed during the moral come of examination, the wall of the vein ruptured said day entered the vein. At all times, manifestition of toxicity were alight sod there was no evident of a embolium. Marzure D Sane, 110

### **MISCELLANEOUS**

### CLINICAL ENTITIES—GENERAL PHYSIO-LOGICAL CONDITIONS

Albaugh C. II : Congenital Anomalies following Maternal Rubella. J Am M Asr 1945 129 719

The author reviews the reports of Gregg Reese, Swan and others on the occurrence of congenital defects following maternal rubella and reports an additional o collected and personal cases

Of the o cases studied by the author 7 of the mothers had rubella, 1 morbilli, and 1 was exposed to morbilli. All of these cases occurred within the first 10 weeks of pregnancy and 4 occurred in the first 4 weeks.

Eight of the 9 infants had bilateral congenital catanets and in 7 the pupillary reactions to light were poor Strabusmus was noted in 7 cases and nystagmoid movements in 4. No glaucoma was noted Eight of the infants had congenital heart de fects and 4 of these showed evidence of cyanous Two minants died of cardiac failure. Five of the infants had definite microcephaly and 3 were recorded as uncertain cases. Retarded development was noted in all cases, and 7 were considered feeding problems.

The author concludes that available data would suggest that too per cent of the mothers who con tract tubells in the first two months and approximately so per cent of those who have rubells in the third month will give birth to infants with congenial abnormalities. The most common lesions are congenial cataracts cardiac defects, deaf mutism and microcephaly. Poor development of the infants and feeding problems are common.

ORLAND B SCOTT M D

Walsha, F. M. R.: Aeropareethesia" and So-Called "Neuritis of Women a Hands and Arms Bril II J. 1045, 21 506.

A syndrome found chiefly in women and charac crized by numbress tingling and uselessness of he hands and fingers is described and its etiology and treatment are discussed. It generally is seen in we groups of women (r) middle-aged or elderly romen who especially in wartime have had to carry a unwonted manual effort, and (2) younger women the are burdened by childbirth in addition to actory or house work. Factors common to all cases re fatigue and debility and the heavy use of the ands and arms Symptoms begin gradually, attain attimum severity after some weeks or months, and hereafter fluctuate in severity according to the con lition of the patient and treatment. They consist of eresthesias most severe on arising waning during he day's work but increasing in the evening often o the extent that they awaken the patient during he night. Positioning of the arms may offer tempoary relief These subjective symptoms predomi

nate although certain objective sigms such as chronic fatigue atonic musculature low-set shoulder girdles and a rare obliteration of the radial pulse on traction of the dependent arm suggest the syndrome Rest alone gives permanent relief such measures as vitamin therapy physiotherapy estrogens or thy rold extract are superfluous

The etiology is thought to be mechanical, in the altered tonographical relationship between the shoulder gardle and the normal upper thoracic out let. The lower components of the brachial plexus and on occasion the subclavian artery are com pressed between the first rib and the clavicle which sags under the general atony of the muscles support ing the shoulder girdle. Pressure syndromes associated with a rudimentary seventh cervical rib or an abnormal scalenus anticus muscle should of course be ruled out however these syndromes are usually unflateral and present more evidence of vascular disturbances in the arm than the less severe normal pressure syndrome of the first rib which is here described. No relationship has been found be tween the syndrome and pregnancy per se.

Rest in bed or the simple essistion of manual work produces appreciable relief and final disappearance of the symptoms. Initially a week in bed and a sedentary position during the day with the arms in slings, effectively brings relief to the patients. Abstention from heavy work, with the arms supported in alings for a longer period when possible, together with aboutler massage and general tonic treatment, tends to prevent recurrence. Analysisis may be used as an adjunct.

PHILIP B CHASE, M.D.

Gorcoran, A. C., and Page, I. H. Post Traumatic Renal Injury; Summary of Experimental Observations. Arch. Surg. 1945, 51, 93

The nature and treatment of post traumatic renal injuries were studied experimentally by mean of investigations of the renal function in the following states (1) hemorrhagic shock, (2) tourniquet shock and (3) simulation of the crush syndrome.

Shock due to hemorrhage was produced in dogs by repeated severe bleeding and transfusion. The shock due to prolonged or repeated bleeding is be hered to cause a depression of the renal function by causing a vasconstrictive ischemia which is not released by the transfusion of blood and restoration to normal of the arternal pressure. The persistence of renal ischemia and anoma in experimental shock due to bleeding seems to explain the prolonged depresion of renal function which may follow bleeding in human beings. Therapeutically it is aguificant that renal denervation does not prevent the vascon striction hence, there is no experimental basis for the treatment of posthemorrhagic urnary suppression by spanial anesthesis or parayertebral block. The nature of the abnormality makes the use of vasoconstrictor drugs illogical.

To study the conditions of crush syndrome, the renal function in dogs was observed during the onset of shock resulting from the experimental application of tourniquets partially occluding the arterial in flow Renal vasoconstriction develops more rapidly and more severely during the onset of shock due to skeletal trauma than in shock due to bleeding in which these damage is milder and more diffuse.

The severe renal damage of the crush syndrome seems to depend on the combination of renal damage from trauma and that caused by muscle pigment. Both post traumatic renal ischemia and myorlobinuria were then produced in rata by the application of a tourniquet and the injection of myoglobin. Dogs were not satisfactory for this experiment as trauma severe enough to cause severe renal ischemia was followed by death within 24 hours, whereas minor trauma was followed by recovery Renal damage is apparently produced by a combination of vasoconstrictive ischemia oluguria, and aciduria, with deposition in the kidneys of muscle pigment or myoglobin.

In applying these principles to treatment, the prevention of the deposition of plament is accomplished by reversing the conditions of alleurus and aciduria, which favor it. The treatment of shock by transfusions and pressure bandages inhibits the renal vasoconstriction on which oliguria may de pend A free flow of urine may occur during the re-establishment of blood volume by transfusion. and when this is not achieved or maintained gelatin may be added to an infusion of sodium factate containing calcium lactate, since gelatin is itself mildly diuretic. A small dose of another diuretic such as sodium sulfate may be given. However the dangers and the ineffectiveness of alkalinization by the injection of citrate as the sole means of treat ment are pointed out. LUCIAN J FROMDUTI, M.D.

Abbott, W. E., Pilling, M. A., Griffin G. E. Hirah feld J. W., and Meyer F. L.: Metabolic Alterations following Thermal Burns. Ann. Surg

In recent years there has been some controversy concerning the best means of combatting shock in severely burned patients. Although there are a number of methods which apparently suffice to tide patients over the critical 48 hour period following an injury their influence on the subsequent course of the patients is not well understood.

The authors compared a group of patients who were treated with plasma with another group who received whole blood intravenously and an electrolyte solution orally The changes observed in various blood constituents and in the elimination of water

and salt were recorded.

From the work presented and previous experi mental work the authors draw the conclusion that the giving of whole blood early prevents or alleviates the anemia which occurs so commonly during convalescence from a burn. Previous observations demonstrated the fact that a state of overhydratus may in some instances, contribute to a decrease in the hematocrit, and also in the plasma protein co-

contration.

Patients with a severe or moderate bern account late large amounts of fluid in the tranmaticed are regardless of the type of therapy employed to combin shock, but it has seemed that the edems distribled more rapidly when salt solutions were used than when large amounts of plasma were administrate When plasma is given much additional protes is provided, but there is no evidence to show that the plasma protein in itself is of more than temporary value in these burned petients. In some of the mthors patients who received large amounts of plasma low protein values were encountered, sai in 3 of the severely burned patients these low values persisted until death. There is no reason to sesent that the giving of whole blood would be more lessficial than plasma for the prevention of hypopoteinemia, but the evidence indicates that the giving of plasma does not prevent the decrease in the

plasma protein concentration. It has been generally believed that by increasing the blood osmotic pressure by the addition of please proteins, especially albumin, shock could be pre vented or corrected. In peripheral circulatory collapse resulting from a burn, however the abuse is rapidly lost. Thus, most of the osmotic effect of albumin or of the entire plasma proteins is transmit and when it is lost through the capillary walls in the injured area it must continue to exert an camete pull toward the injured tissues because of the protein which has then accumulated in that region Since much of the administered protein is lost in patients in shock resulting from a burn, it would seem as though the best treatment would be (s) give a substance which exerted an osmotic effect and would not be lost, (b) to render the injured cap-laries less permeable, if this is possible or (c) is increase the tissue tension to a point at which first would no longer tend to leave the capillaries

excessive amounts.

Apparently there is a substance derived least the surface of fresh plasma which has a coating effect and therefore tends to decrease the capillary perme bility Therefore, it would appear as though whole blood or plasma would have some advantage ord a salt solution alone, but since capillary permeability cannot be quickly or completely restored to normal it would seem logical to give an electrolyte solution so that these tension would be increased.

From the results presented by the authors it can be seen that wide differences were found in the hematocrit readings during the period of shock which could not be correlated with the criest and depth of the burn. The hematocrit, therefore, frequently a poor guide to the type and amount of treatment that is necessary especially since it influenced by a pre-existing anemia, and the rate and number of cells destroyed or trapped from the general circulation at and following the time of in jury and because the normal hematocrit varies quite widely

In the treatment for the first 48 hours at seems logical to give approximately 50 c c. of blood to adult patients for every per cent the body surface is barned, or to give blood in amounts equal to from t to s per cent of the patient a body weight in kilograms. In employing the electrolyte solution it seems desirable to give a slightly hypotonic solution (from two-thirds to three-quarters strength) in order to increase the rate of urine excretion and in a mounts equaling from 10 to 15 per cent of the pa tient's body weight during the first two days following the burn. Since there has been little experience with this form of treatment no absolute rules should be employed but the treatment should be modified according to the severity and the degree of the burn and the size and response of the patient When abook is not severe treatment may be given relatively slowly but if the patient shows evidence of penpheral vascular collapse, therapy should be carned out rapidly until the condition has improved and unne is being excreted. It should be remem bered that the larger quantities advocated are comparable to giving amounts of fluid which are roughly equal to an individual a total extracellular fluid volume (plasma and interstitial fluid volume), hence, when such amounts are employed additional liquids and foods should not be given or should be permitted only in small quantities for the first two days, as this would lead to an excessive fluid intake. If it seems desirable, dextrose can be added to the fluid to provide calones or some form of protein could be added to the electrolyte solution severely burned patients it has seemed that high calone and protein intakes are better avoided ini tially The authors usually give from 800 to 1 000 calories in the form of dextrimattose daily for the first several days which supplements the vitamin intake by from two to five times the normal daily requirement.

In most of the patients excessive hemoconcentration was not encountered when whole blood was given provided an adequate amount of salt solution

was employed.

When the hematocrit is definitely elevated (from 55 to 60 or more) the patient s blood pressure is low and little urine is being excreted, the authors see no reason that plasma should not be given instead of whole blood if it seems to be desirable. By the addition of red cells more oxygen might be carried to the tissues and, hence anoxia prevented but it probably is not wise to increase the proportion of cells too much or the beneficial effect will be overcome because of stases and a slowing of the circulation. Therefore if bemoconcentration is not excessive it probably would be preferable to give whole blood intra venously and an electrolyte solution orally but if the hemstoomt rises to 60 or above plasms or a concentrated albumin solution should be temporarily substituted for blood TOSKER K. NARAT M.D.

Rifkin H. and Thompson K. J: Structural Changes in Early Filariasis Arch Path Chic. 1045 40 220.

The present report is based on a study of 30 cases of early filterials. An ecunophilia of from 6 to 11 per cent was found in 60 per cent of the cases. In the majority of the patients painful enlargement of the superficial lymph nodes of the arm or leg was the first physical sign. In 40 per cent of the cases the gentialis and the lower extremity were involved in a brawny edematous lymphangitis or an acute replidlymorphicultist. In 30 per cent both the upper and lower extremities were involved in the disease process.

Biposy of the lymph nodes showed the presence of the filaria (Wucherena bancroft!) in 20 per cent of the slides while in the other 80 per cent the histology was characteristic of filariasis but the organism was not shown.

During the early stage of invasion, the lymph nodes exhibited extensive hyperplasia of the primary and accondary lymph follides and counophilic in filtration. The lymphatic vessels contained a plnk like albuminoid fluid characterized as fluid lakes the entire histological picture was in conformity with that of an acute systemic allergic reaction with manifestations of cosinophilis, edema, and hyper planas. The subscute and chronic phases of the disease were characterized by an epithelioid cell endolymphangitis and perllymphangitis culminating in a typical granulation ussue reaction and finally fibroblastic proliferation.

Elephantiasis occurred only in those cases in which secondary streptococcic invasion took place

BANIAGE G P SHAPROFF M.D.

Roth G M. and Kvale W F: A Tentative Test for Pheochromocytoma. Am. J M Sc 1945 210

Paroxysmal hypertension and associated symptoms characteristic of the clinical syndrome caused by pheochromocytoms have frequently been de acribed but the differentiation from such clinical conditions as coronary occlusion, hyperthyroidism. histamine cephalgia, migraine, menopausal and anxiety states, and persistent hypertension may he difficult. The most confusing cases are those of the hyperreactors and those in which the patients have essential hypertension with extremely labile blood pressure. In the past the diagnosis of suspected pheochromocytoms was confirmed by the attack which characterized this clinical entity. These attacks were precipitated by various means in cluding physical exertion change in position, massame of the abdomen on the side of the tumor im mersion of the extremities in cold water or the administration of insulin or of epinephrine. Since none of these methods of inducing attacks is de pendable the authors believed that a simple proce dure which would induce attacks at will would be of great help in diagnosis. They review the literature dealing with the subject and then give the results

of their own tests in the hunt for a simple proce dure which might be used in diagnosing patients with tumors of this sort. Their results are summarized as follows

An intravenous injection of c.o.s; mgm. or o o; mgm. of histamine base was given to y; persons, who were divided into four groups as follows group 1; normal persons whose ager ranged from 20 to 48 years group 2; persons the cold presor test whose age ranged from 10 to 50 years group 2; patients who had well established hypertension and whose ager anged from 3 to 67 years and group 4, patients suspected of having pheochromocytoms whose ager anged from 30 to 50 years and group 4, patients suspected of having pheochromocytoms whose ager anged from 30 to 50 years.

whose ages ranged from 30 to 50 years. In the first three groups the blood pressure rose to a level somewhat less than the elevation obtained by the cold pressor test. Except for finishing of the face with subsequent headache, which was most intense in the patients with severest hypertension and pronounced tachycardis, no other symptoms were present. The results of the test were regarded as negative. In a instance typical bistamine cephalgas was produced by this amount of histamine best.

When histamine base was given to 3 patients who had pheochromocytoms, the blood pressure rose approximately to 100 mm, more than the elevation obtained by the cold pressor test. This elevation of blood pressure was accompanied by the character little symptoms of a typical spontaneous attack.

Although the number of cases in this series is anall, the intravenous injection of small quantities of histamune base may be considered tentatively as a worthwhile test in distinguishing the syndrome of pheochromocytoms from other clinical conditions.

PAUL MEDICE, M.D.

Duffield T J, and Jacobson, P H.: Cancer Mortality and Marital Status; an Analysis of Deaths Attributed to Cancer among the White Population of New York City during 1929-41 J Nat. Casser Int. 945 6 9

During the years from 1939 to 1941 the recorded number of deaths from cancer in the white popula ton of New York, New York (15 years of age or over) was 34 010. These deaths were distributed by sex as follows single males, 2,93 single females, 2 855 other males, 15,07 other females, 14,459.

Using these figures and data in regard to the marttal status of the population from the 1940 census the authors were able to draw the following conclusions

from the study of various types of cancer

In cancer of the breast the death rate among
aingle women at ages over fifteen years was more
than 1/4 times that of other women. Between the
ages of 15 and 34 years the rate among the married
women was about one third higher than that among
the single women, but at all ages over 14 years the
single women had higher death rates. Between the
ages of 45 and 55 the rate for unmarried women was
70 per cent higher than that for married women

The mortality rate from cancer of the uterus was 15 per cent higher among married women than among single women. Between the ages of 35 and 74 however the rates were apparently equal.

3 In cancer of other female genital organ the death rate was 41 per cent higher in single women than in other women.

4. For all ages over 15 years the death rate five cancer of the gentlourinary organs in rades vaabout equal in the married and unsurrind group. Between the ages of 45 and 54 the mortality rate among single men was 50 per cent higher the among married men, but it was found to be 35 per cent lower between the ages of 65 and 71.

5. At all ages over 15 years the mortality me from cancer of the buccal cavity was 35 per centhigher in single men than in married men. The mortality rate was slx times as great among men as

opposed to women.

6 In cancer of the atomach the mortality air was so per cent higher among married women that among spinaters. The difference among the sale was not considered significant except after the are/ 75 years when the rate for single men appeared to be lower.

7 In cancer of the peritoneum and other portion of the digestive tract there was no significant difference between married and unmarried women. The rate for married males was 11 per cent higher than that for buchelors.

8 There were no agnificant differences between married and unmarried groups in carcinoma of the

respiratory system.

9 In all other types of cancer (analyzed as exgroup) in both males and females the rates wer higher for single persons. ORLAND B. SCOTT, MD

Coller F A., Iob, V., Vaughan, H. H., Kalés, N. B. and Moyer G. A.: Translocation & Fluid Produced by the Intravenous Admiritration of Isotonic Salt Solutions in Mrs. Postoperatively Ass. Surg. 945, 13 66;

During the past decade, Coller and his make orators have repeatedly directed attention to the potential tomaty of as-called "physiological unit solution, especially when large amounts reintered. They have emphasized that these dearier and the collection of the collection of the operative period of the side kurgical patient.

Studies to determine the manner in which he human body harmonic printra-const infusion of human body harmonic larger intra-const infusion of satisfactions of the satisfaction of the sati

The patients who served as subjects were selected only in that it was determined that they were free of gross cardiovascular and kidney disease.

The normal kidney is able to concentrate charke taken orally at the rate of from 0, e9 to 0,33 mEq per

milliliter. In spite of heavy salt loads no patient studied by the authors approximated this value. As a result of the increasing sait load and increasing hypertonicity of the extracellular compartment, osmotic relationships can be maintained only by a shift of water from the intracellular to the extracellular space Loads of salt created by the isotonic solutions require a transfer of approximately a liters of intracellular water within 30 hours after operation. The edems, a symptom of postoperative salt intolerance may result not so much from the retention of water with sait as from the shifting of water from the in tracellular to the extracellular space. It is unknown how much dehydration the cells can undergo before function breaks down and ceases. The brain cells are especially sensitive to change and the disorien tation so often seen in cases of sait intolerance may

be a symptom of this fluid shift.

The authors summarise their findings by stating that the injection of isotome sodium chloride solutions was attended by an average retention of 35 per cent of the chloride and 19 per cent of the chloride and 19 per cent of the chloride and 19 per cent of the water 30 hours after the operation. Such retentions of salt indicate a withdrawal of approximately a liters of fluid from the intracellular compariment in order to maintain isotomicity. The indusion of hypotomic solutions resulted in the average retention of 27 per cent of the sodium 32 per cent of the chloride and 30 per cent of the water during the same postoperative period. Extra water is thereby provided for excretory function of the skin and lungs and the intracellular compariment is

The human kidney under the conditions of the experiments, did not elect to guard a physiological saline solution

The authors conclude from their experiments that if intravenous infusion is indicated in the postopers tire care of the surgical patient, hypotonic solutions (0.45 per cent sodium chloride or better 0.38 per cent sodium chloride plus 0.11 per cent sodium thoride plus 0.11 per cent sodium be carbonate) should replace the isotonic solutions commonly in use. JORKER K. NALT M.D.

### GENERAL BACTERIAL, PROTOZOAN AND PARASITIC INVECTIONS

Rubenstein A. D., Tabershaw I R. and Daniels, Jt Pseudo Gas Gangrene of the Hand J Am If Arr 1945 129 659

Three cases of a new syndrome characterised by the rapid appearance of subculaneous gas tumor masses within a few minutes after a superficial accration of the hand occurred in a plants, where an alloy composed of 90 per cent magnesium was being used. Each patient had handled this material in a finely powdered form prior to the occurrence of the fajury. It is possible therefore that an ethological relationship exists between the alloy and the syndrome.

Because this syndrome may simulate gas gan grene, it is important that its clinical characteristics be borne in mind in order that unnecessary surgical procedures may be avoided. The syndrome is characterized by a rapidly developing swelling of a superficially injured part with crepitation and with an almost insignificant constitutional reaction.

SAMUEL KAHN M D

Anderson D G and Jewell, M: The Absorption Excretion and Toxicity of Streptomycin in Man. N England J M., 1945 233 485

After oral administration, streptomycin is not absorbed in amounts sufficient to produce detectable concentrations of the drug in the serum. The failure of the drug to be absorbed from the gastrointestinal tract is not due to the mactivation of the streptomycin by the gastric luice.

After intramuscular or intravenous injection of a given amount of streptomycin, the curves of the serum concentration of the drug do not differ significantly except during the first few minutes after injection. Following the intramuscular or intravenous administration of a single dose of streptomycin, from 46 to 87 per cent of the dose injected can be recovered in the urine within 24 hours.

Streptomycin is excreted more slowly by the kidneys than is pencillin. It appears likely that effective blood levels of streptomycin can be main tained by administering the drug at intervals of from 6 to 8 hours.

The intrathecal administration of streptomychi in doses up to 20 000 units does not produce signs of meningeal irritation. With doses of from 12,000 to 20,000 units an appreciable concentration of the drug can be maintained in the cerebrospinal fluid for at least 24 hours.

No serious toxic reactions follow the injection of aingle doses of streptomycin in amounts up to foco, oo units or after the continued administration of the drug for periods of from z to 3 weeks, in dozes totaling from z 725 coo to 18 130 coo units. The intravenous and subcutaneous injections of concentrated solutions of the present preparations of streptomycin cause too much discomfort to warrant the use of these methods of administration. The drug can however be administered in an intravenous influsion without the production of un pleasant symptoms. Intramuscular injections are fairly well tolerated for periods of from one to two weeks. Therapy continued beyond this time may cause severa discomfort.

Three cases of infection due to a gram negative bacillus, and treated with streptomyon are reported. No conclusions concerning the efficacy of

streptomycin can be drawn from them.

Samuzi Kanw M D

Heilman D II., Heilman F R., Hinshaw H. C. Nichols, D R. and Herrell W E.: Streptomy cln; Absorption, Diffusion Excretion and Toxicity Am J M Sc., 1045 210 576

Streptomycin was administered by continuous intravenous drip so that some patients received as

## TABLE I -CONCENTRATIONS OF STREETOMYCIN IN BLOOD SERUM FOLLOWING REFERTED BY

Care	Ministration of Myplomyces			Streptorayela in Mont servin (unut per )							
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#### TABLE II -STREPTOMYCIN IN CEREBROSPINAL FLUID

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#### TABLE III -EXCRETION OF STREPTOMY CIVIN BILE

	detection of strepton		Day		1		Tellak	
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much as four million units per day. The streptomy cin unit was that quantity of dry material which inhibited the growth of a strain of escherichia coil in r.c., of nutrient broth or again.

In a patient receiving two million units of streptomycin daily, the blood was found to contain 31 units per cubic centimeter of the antibiotic. The intravenous administration of streptomycin was not attended by severe thrombosus of subcutaneous imitation when infiltrated Intermittent intra venous administration resulted in a high concentra tion of streptomycin which then fell rapidly. Intermittent intramuscular injection appeared to be the method of choice because effective concentrations were present in the blood for from a to 6 hours high potency such as 100 000 units can be given readily in r c.c. of normal saline solution Subcutaneous administration of streptomycin also maintained effective concentrations in the blood Intrathecally single injections of 100 000 units were given for meningitis without any serious reactions and with significant concentrations of the antiblotic for as long as 24 hours. The nebulgation of streptomycin for tracheobronchial pathology for a period of 4 weeks at 400 000 units per day caused no serious reactions The oral administration of streptomycin at 125 000 units every 6 hours caused a significant reduction in escherichia coli in the bac terial intestinal flora and was not followed by any absorption into the blood stream. Diffusion of streptomycin into the cerebrospinal fluid did not take place except when large doses were given parentally during meningitis Placental transmussion of streptomycin from the maternal blood stream to the fetus occurred readily after parenteral administration. Streptomycin was twice as con centrated in the biliary system as its average con centration in the blood Liver function was not impaired by this antibiotic as evidenced by the normal values of bile and bile salts. From one half to three fourths of the streptomycin was excreted in the urme in 24 hours.

Toxic reactions to streptomycan were rare but may be manifested by chills and fever generalized flush ing toxic crythema urticaria, and joint pains Streptomycin did not appear to have any effect on the hemolytopletic system. As a rule streptomycan did not impair real function except when extremely large amounts were given, as a result of which there was evidence of temporary renal irritation.

BENGARM G P SHATEGAT M.D.

#### DUCTLESS GLANDS

Gabrilovs, J. L., Kert, M. J., and Sofier L. J. The Use of Thioursell in the Trestment of Patients with Hyperthyroidism. Ann Int. M. 1945 25 537

Thoursell was used in the treatment of 54 patients of whom 51 had hyperthyroidsm and 5 had sontoxic goiter Thirty three of the patients were reated successfully with thoursell for varying

periods of time the longest period of continuous therapy being to months. Four of the patients had recurrent hyperthyroldism, and the remainder had diffuse hyperplasia or toxic nodular gotter

Three patients with hyperthyroldism were successfully prepared for operation with thiouracil, but 4 patients with hyperthyroidism failed to respond satisfactorily to thiouracil. The latter were subsequently prepared with iodine and successfully operated on. In 11 instances thiouracil therapy was discontinued because of severe tonc reactions.

The following toxic reactions were encountered conjunctivitis in 5 cases edema in 1 case drug fever in 4 cases leucopenia in 1 case and agranulocytosis in 6 cases. Some sort of toxic reaction was found in 31 per cent. The development of agranulocytosis or drug fever are indications for the cessation of thera py Treatment may be safely continued in the presence of conjunctivitis.

Studies of liver and kidney function throughout the course of treatment failed to demonstrate any ordence of injury to these organs resulting from the thiouracil However instances of toxic hepatitis occurring during thiouracil therapy have been reported

Because of the frequency and severity of the toxic reactions thiouracil should be used under the follow ing circumstances: (i) in the preparation of lodine fast petients for operation (2) in older individuals with hyperthyroidism, in whom operation is danger out and (5) in patients with recurrent hyperthy roidism who have been operated on twice or more Savez, Kams M.D.

#### SURGICAL PATHOLOGY AND DIAGNOSIS

Stewart F W Foote, F W and Becker W F Mucoepidermoid Tumors of the Salivary Glands. Ann Surg 1945 122 820

The authors for many years have been interested in a group of salivary gland tumors different structurally from the commonly recognized tumors of this type They were unable to find adequate clinical and pathological descriptions of these tumors and were in doubt as to their terminology histogenesis and prognosis Gradually by correlating the histological structure and clinical course it was nosaible to distinguish two structural types one capable of localized growth and the other of metastasizing The term "mucoepidermoid salavary gland tumor expresses two of the principle histological features. The authors believe these tumors represent a little more than 5 per cent of all combined major and minor salivary gland tumors and they deserve more prominence than they now possess.

As a group these tumors show a broad range of histological variation depending on the relative proportions of different cell elements which are present and tendencies to ward diffuse overgrowth by a single cell type. There is no gross uniformity some are cystic, some solid, some encapsulated, others not. Recurrences may be situaturally different

from the primary growth. It is likely that many of these tumors have been classified as cystadenomas basalomas evlindroma adenocarcinomas or socalled mixed tumors.

The authors then h t a number of cases in the literature which may be tumors of thi clas ification. They believe that thi group has been dealt with sparingly in the literature and is a group which is unfamiliar to many experienced pathologists

The material f r this analysis was obtained from the records of the Memorial Hospital, New York New York pertaining to approximately 700 major and minor salivary gland tumors of all types observed between 1928 and 1913. Of this sence 45 cases were clas ibed as mucocolilermoid tumors All of these contained mucous cell and cells with epidermold qualities.

All evidence in this material points to the salivars gland ducts as the anat mic site of origin of mucoepidermoid tumors. These tumors can be separated into two histological types—benign and malignant The term benign as used here does not necessarily imply innocent behavior but does mean that thus far the authors have not observed meta tases from these tumors. Malignant means a hist logical structure a sociated with the ability to preduce

regional node an I distant metastases

In 14 f the 26 benign tumors the predominant cells were epidermost in a they were mucous and in a they were basal. At lea t three cell types w re represented in the majority and the presence if multiple cell types in large numbers was more character ratic of benign than I malignant tumors. In a restricted area, the patt in depends on the predominant cell type. If basal or intermediate cells prelominate a unil rm mosaic result with sheetlike groups of varying sizes, the peripheral margins of which are sharply delineated as seen in a basal cell enthelioms or a sweat gland adenoma

In areas of mucous cells ne sees instead quite small or even greatly dilated ductlike structures which are lined by one or several cell layers. Some of these areas assume papillary qualities and not in frequently possess a central core of vascularized fibrous tissue. In some of the ductlike or cyrtic areas are found "mucus pool which stain brilliant red with Mayer's mucicarmine. If there is over production of mucus, dilatation ensues with erosion of the lining epithelia disruption of the basement membrane and leakage into the adjacent tissue This may result in necrosis or a marked secondary inflammatory process with an associated foreign body reaction with multinucleated giant cells.

In foci of epidermold cells, it is unusual to find complete di sociation from basal or intermediate cells, and when the cells assume squamous qualities there is apt to be a diffuse unicellular overgrowth These cells are similar in size and shape their staining qualities are uniform and mitoses are few One is ant to regard the tumor as malignant until greater familiarity with its structure is obtained About one third of the benish tumors showed certain

areas composed of cells hydropic and smiles of similar to the clear cells of a renal adenocaronors One may assume that these cells contain much be none takes the mucicarmine stain.

In 14 of the 10 malignant tamors, epidentsal cells were predominant and in only \$ were work cells even second most frequent. By epilemod cells is meant cells similar to basal cell caremona esquamous cells without intercellular bridges and Leratohyalme granules Intermediate cells, slighty larger than a basal cell and with more rescuir nuclei and more abundant cytoplasm, were a be quent cellular component of these malignant tumor. Columnar cell were rare True squamous cells shi intercellular bridges and keratohyaline granin were found in c cases.

The outstanding characteristic of these malicum tumors is a diffuse proliferation of rather real. moderately hyperchromatic rounded and oral acin sheetlike arrangement with a tendency towns palisarling at the outer layer surrounding the reliferating sheets and pegs of the tumor. The =pression is one of a basal cell coitbelions with sive thing added, and there is an appreciable resemblant t the transitional cell careinomas of other locativa.

Malignant tumors show little tendency to larg microcysts. Tubular and papillary features are refrequent and mucus pools practically sent ead. The histological structure of meta tases sharply a-

flect the variable structure of the primary keet Mucus cells were found in metastases in 5 cases The 14 primary and 9 recurrent benish tumor

varied in size from 4 mm. to 4 cm. in dancies averaging between a and 3 cm. They were ovel b shape and well circumscribed, usually with a per capsule. Usually these tumors were moderately fra but not indurated A majority were at least party cyetic and contained nearly clear opalescrat, blood stained mucoid material usually visid. The nearly solid tumors were gravish white or grayatpink but not lobulated. About one-half of the tumors showed discoloration due to secondary hemorrhage and/or pecrosis

Of the 19 malignant tumors only to were exist (s primary and 6 recurrent) The majority were be tween 2 and 3 cm. in size and the largest 5 cm. Let of encapsulation was a distinct feature and mot of them were obviously infiltrative There was med less eyet formation than in the benign tumors, and none showed grossly vuible mucus aggregates. The were distinctly firm cellular, oraque grayib akm. and homogeneous with fairly common hemorism and necrosis.

A study of the ages of the patients at the oriet of their symptoms shows a general trend for the benig tumors to occur in a younger age group. Forty-tro per cent of the benign tumors occurred to patient more than 40 years of age and 65 per cent of the malignant tumors occurred after this age one of the benign tumors occurred after 60 years of age. but one fourth of the malignant tumors and got

symptoms after this age

abdomen.

The parotid salivary glands were the most com mon sites of both benign and malignant mucoepi dermold tumors the majority being benign other major salivary glands were involved only ex ceptionally. Nearly one third of the tumors (mostly malignant) occurred in the minor salivary glands in a variety of locations.

Painless swelling was the outstanding symptom in the benign series. Slow growth and absence of in volvement of the facial nerve were commonly re ported Several patients had local pain or bloody sputum and a cases were found on routine physical examinations. There was a wide fluctuation in the duration of symptoms. Nine patients had symptoms for a year or more and several had had them for five vears.

The syndrome was far more varied for the 10 mahenant tumors. This was largely due to their location within the oral and nasal cavities and the more aggressive growth of these tumors patients (42%) reported a painless swelling as the original symptom. Three noted painful swelling Others complained of nosebleed a mass, lacrimation or a nasal discharge. One patient first noted a metastatic lump in his neck. Other symptoms which occurred during some phase of the disease were numbness of one side of the tongue, interference with speech, dryness of the mouth and sore throat. Lacrimation, trismus and facial nerve weakness were seen in r case. Pain was a prominent symptom in most cases sooner or later. Three of these cases gave a history of cachexia and weight loss. About one half of the patients reported a rapid increase in size of the mass.

Six of 10 patients had symptoms for less than one year Two cases are presented as evidence of the transformation of benign into malignant tumors

The benign tumors whether recurrent or not, were nearly all described as firm. An occasional one was elastic or rubbery and only 2 were considered cystic. Most of the tumors were well defined but not as sharply as the so-called mixed tumors. Five of the so paroted tumors were firmly fixed and several others had infiltrated the skin. All of the primary tumors were single but 2 of the recurrent cases showed multiple discrete nodules. The 5 benign tumors of the minor salivary glands were submucosal except for 1 polypoid nasal tumor. Two of these tumors had ulcerated through the mucosa.

The malignant tumors whether primary or recur rent were firm fixed, poorly circumscribed and in filtrative Both submaxillary tumors fungated through the skin. One parotid tumor interfered with the facual nerve All but 2 of the minor salivary gland tumors showed mucosal ulceration. The intra oral and intranssal tumors were complicated by erozion and penetration of adjacent bony structures

In 11 of the 26 benign cases the tumors had recurred after surgery when first seen by the authors (3 of the 11 were twice recurrent) Late recurrence may be characteristic of these tumors. Ten of the recurrent tumors were paroted and I nasal

Of the 10 malignant cases o were recurrent after surgery when first seen, (5 of the 9 patients had more than 1 re-excision) Rapid recurrence was much more likely in this group. Ten patients on initial examination showed clinical evidence of metastases to the cervical or supraclavicular lymph nodes. In 4 of the 10 cases the primary tumor was in the major salivary glands.

Distant metastases were seen in the cervical mediastinal para-aortic, and iliac lymph nodes in the lungs pleurae myocardium and liver and in the subcutaneous regions of the face scalp axilla and

In 14 of the cases of benign tumor treatment was

started more than 5 years ago. Three have been lost to follow up and were free of disease 1 2 and 2 % years respectively when lost. Nine patients were alive and free of disease, and a had recurrences which are probably inoperable. Two of the 5 year cures were from irradiation alone and 3 followed surgical excision alone Four of the o cases were subjected to combined surgical excusion and radia tion treatment. Radon seeds were implanted in the operative area in each case. One case received additional external irradiation also

The highly fatal character of the malignant group is shown by the fact that 7 patients are dead surviv ing 2 t x 8 and 0 months and 2 and 10 years after treatment respectively. Five of these 7 patients had clinical or nathological evidence of metastases when treatment was begun. Twelve patients are living 2 have locally uncontrolled tumors and 1 has subcutaneous metastases. One patient alone is alive and free of tumor after 5 years. Two are living 3 1/2 and 2 years respectively and believed to be free of tumor The follow up period in the remaining 8 still living is too short for significant comment.

ROBERT R. BIGIELOW M.D.

liinton J W., and Lord J W., Jr Surgery in Toxic and Nontoxic Nodular Goiter J Am M Ass 1945 129 605

All nontoxic nodular gosters should be removed surgically because of the relatively high incidence of unsuspected cancer

Thioursell is contraindicated in the treatment of toxic nodular golter and operative intervention is the treatment of choice | Jose I MALONEY M D

#### EXPERIMENTAL SURGERY

Thompson S. A. and Pollock, B: The Use of Free Omental Grafts in the Thorax. An Experi mental Study Am J Surg 1945 70 227

Free omental grafts when applied to such thoracic structures as the pleura, the cut surface and edge of the lung the bronchus, the esophagus the aorta, and the vena cava, became adherent and viable in a large percentage (95%) of the experimental animals Four of the grafts in the senes failed to take. Three of the graft failures occurred in autogenous grafts and 1 in a homologous graft. In a of the fallures the graft

actical force annual autyfred 4 calmonators in the liver and remained autyfred 4 calmonators. in good condition.

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McGill, C. M. Hernias and Serious Injuries.

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It was not possible because of the variation in workmen a compensation has to compare the ten groups on the reals of form reas to combate me re-The arcisec of scrience cases and bernias per ment bet 1'000 emblokes poset et sposs per per une mente bet une entre de service for hernias is over three times as high, and for more ing the party times as high in the party side. did bot conduct proplectment examinations at the CORRESPONDING TAKE IN the Part that did conduct each craminations. ONTEND B SCOLL TID

# SURGERY

## GYNECOLOGY AND OBSTETRICS

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#### HITS STRIKES AND OUTS IN THE USE OF PEDICLE FLAPS FOR NASAL RESTORATION OR CORRECTION

VILRAY P BLAIR, M D FA.C.S and LOUIS T BYARS M D F.A C S St. Louis, Missouri

THE purpose of this paper is to illustrate some of the underlying factors that can make either for success or for failure in the substitution of skin bearing flans for lost or lacking nasal tissue Such flaps may be used alone or supplemented with cartilage implants or free skin grafts. The need for nasal restorations or corrections might come from (1) congenital absence (total or partial) (2) postnatal growth irregularities (3) tissue loss through disease accident or surgical destruction

#### PREOPERATIVE CONSIDERATIONS

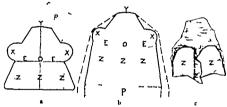
The quality of final outcome and number of operative steps required may be more closely related to the thoroughness of preoperative study and planning than to the skill expended In complex cases it is worth while to check repeatedly the tentative plan otherwise some oversight might necessitate a midstream mod ification causing delay increased operative steps and ultimate disappointment Disappointment is not helped by the feeling that more persistent preoperative study might have prevented the debacle

This survey should compass not only the tissues of the external nose proper and the sources and kind of repair material available but also the condition of the foundation tissues (Figs 7 11 18 26) and of the nasal passages (Figs 5 8 9 15) The latter is unfortunately often missed Fitness and fit are as essential here as in the foundation of a house. The proper time for securing these is before and not after the nose or the house is added Therefore before considering the external nasal repair the underpinnings breathing space and the usable nasal remnants should receive careful scrutiny. Loss or displace ment in the nasal framework or of the related cheek hip columella or septum should also be determined (Figs 5 and 16 ) When present correction of such loss or displacement should be at least visualized before the nasal repair is planned. Restoration of the foundation and repositioning of tissues to give breathing space are parts of one problem selection pattern ing and transplantation of repair material are parts of another problem These two must at least be correlated mentally before surgery is undertaken

Recorded sculptors of less skill than Phidias all preferred to materialize their ideas in clay before risking a false cut on a marble block

Presented before the American Association of Plastic and Reconstructive Surgery October 7 043. Bernard G. Sarnat, M.D. assisted in assembling the material for the case histories

For cancerdings and emphasis the greatly reduced prints in the figures have been preopriately blanked and pendled but without intentional secritics of lines of verity. This study is based on selections from considerably more than knowled fap restorations.



Lie a. Diagram of a forehead flan Z Z' Z is for estibular lini g and columella. Lateral dashed lines (Z, Z) on the lower part show the minimum with of forehead flap for extilusiar folding. Dark outline hows desirable with, often allable in men with receding hairbnes. Making dorsal covering and weilfula infoldings in adequate airway from forthead flap less than 5 centilmeters wide can be difficult.

b. Tharram and plan for infracts icular flan, bether arm or body pulicable here unserent bem or cart lage remains to ri form to the new pose (fig. 18) Observation of eraft lined flaps suggest that 1th no supporting framework a soluble for a near fap, patterned ther the outer dashed line of b the covering part, presi-ously thinned and lined ith contracts a right kin graft should failly ell hold its 

hours I' the messal abstract from which the columella was mad

SERIES A GROWTH OR NAMED THE APPLANTED FLAPS. I this series of cases, teen age or younger some useful comparisons can be mad of growth changes in early repair Discreations the disparity of ages, an ant communion cabe made let cen the case in Figure 2 and that in Figure 4 Though the losses ere simils the former as repaired

with a forebead flan and the latter with an arm flan. The relation of size to growth of a pose made forebead flap will remain more stable and ith an arm or subcla icula flap. If he rather stable if the major part of the supporting structures ha need ted I tact I have a present case in which the estimated allowance for growth proved insufficient.

I grow ng none with est balar haing and covering derived from foldings of the same flap, the similar growth impulse may in time cause ertical making of the confined liaing layer as can be seen by company the /in Figure 3 where repair was made from a arm flap. This was less evident of the forehead flap repair in Figure 3, as shown by the photographs taken a years after final oper ation in each case

In Figure 5 remained ith forehead flan, done the much later are the disproportional changes with growth are less evident. At no stage was there wrinking of the vestibular lining. I igure 5 shows also that even in the use of forthead flap, it is necessary t mak allow nee for some skrinkage emphasized by the change in shape of the ala and tip in a weeks time (compare g with h)

Regarding the cases in Figures 6, 7 and 3 sh enital infection, the common characteristics de elopment of the supp suces with activ or niceration in the line lon of the no. or cartilard. in Figure 6, as made

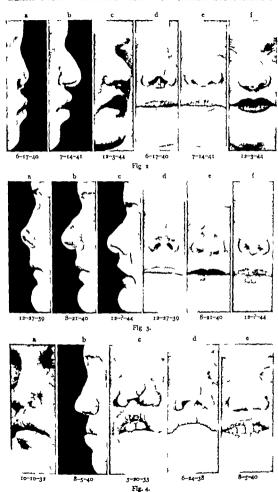
but llowance as mad for growth and rossible later carelare implantation. This accounts for the marked dotal con exity of the completed nose I Figure 7 the child originally had almost no supporting framework, heliqueven columella and premanila. I lugare 8 the reserclosely bound up ith that of the tion of the nose lower lin.

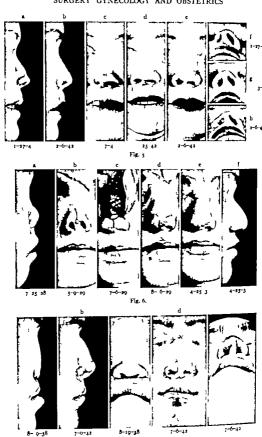
Fig 2 A girl, 10 y are old, th destruction following surface radium applied at 3 weeks of age condition about in a and d. b. Primary application of a forehead fap. The foldings for alse and columnella here shoung ere readjusted shortly afterward to gi better breathing space, c and h Photographs sent t us approximately 4 years after app cation and adjustment of the flan. Comparing how that the right als berder has become lower than the left, but this could, even now be readjusted. Seven aperative steps, major or misor ere required over period of

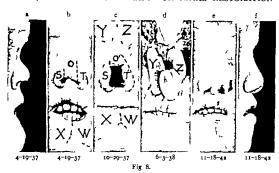
j)can. 1 gl l, 5 years old, ball received destructor and d, there condition its wide radiation in infancy scarring of the lower third of the nove and related columns b and Condition 4 months after surfacing the sore and restoring the estibule ith a upper arm dap c and i Photographs taken proximat by 4 years after find at

partments. It! deficult tithis time t determine bether all of the shortening show in f is real or partially due to some aptilti g in the pose of the photograph that as sent to on live operative steps, major or misor ere dose la les

is t years. Hig 4. Thi supersensitive child was 8 years old her war was intilated. Early arm flap repair failed t heep on third page following)







pace with namel growth. a, Shows radium destruction in infancy causing scarring and crumpled ala. c, After excision of damaged tissue, sufficiently extended to insure drenlation in the transplant, an oversize flap was implanted in the belief that it would provide for future growth d, The years later the above allowance for growth had proved insufficient. At this time the original flap was removed and the distortion was released. An abdominal flap was jumped via the left hand and adjusted. b and e Photographs taken 2 years after final repair. Twelve operative steps, major or minor were done over a period of 8 years.

The new nose is not central in its relation to the lip or the teeth.

Fig 5 A girl 17 years old, was injured 9 years previously a, c and? Photographs show adjacent partial nose and cheek loss with incidental alar distortion and vestibular block. The skin graft on the upper lip had been applied shortly after injury d and g Taken r year after covering the right half of the dorsum with a forehead flap infolded to line the vestibule and piece out the ala. The intentional exaggeration of the alar circumference of the vestibule still shows. Gravity was expected eventually to correct the draw-up of the new alar border b e and h, Show final adjustment of check scar, alar attachment, and symmetrical shrinkage of the alar circumference but the alar border is still above the level of its fellow

This required eight operative steps, major or minor over a period of 1 year

The alar draw up cited persisted.

Fig 6. Congenital deformity in a girl 10 years old a and b, Condition at first examination. After release of the uptilt, repair was usede with a right forebead flap, with a pedicle at the left brow wide enough to supplement both ining and covering, shown in c. d. The covering part of the flap is in position with a prolongation between the reparated also to piece out the tip, e and f Last observed result, 21/4 years later This was done in six operative

steps, completed in 3 months.

Subsequent growth will likely modify the convexity of

the dornal line.

Fig. 7 Congenital deformity in a girl, aged 12 years. and c, Show the condition with the lip repaired and a cartilage previously inserted in the upper two-thirds of the domain. b d and e, A flap from the right lower abdominal Quadrant was jumped via left wrist to the dorsum after removal of the nasal covering and the lower part of the original cartilage implant. Later the columella came from an inner lateral palm flap implanted first into the pasal tip and subsequently into the up, b and e. Owing to circum. stantial delays, the 8 major and minor operative steps

were spread over a period of 4 years. Fig 8. A girl aged 17 years, with history of premature birth reported weight 11/4 pounds. Congenital infection with early ulceration of lips and nasal lining. Left vestibule almost obliterated columella retracted and much of lower lip missing a and b. b, The two vertical lines between s and t indicate full thickness incluious which, after discarding the scarred lining and the related cartilagmous septum, per mitted the turning in of the skin to furnish attachment to the future lining flaps, s' t' o in c X and W indicate full thickness flaps (8, b) In c, flaps Y and W have been rotated to give vertical length to the lip F and Z indicate primary raising of the nasal flaps. d, The nasal flaps Y and Z were again raised, the distal two-thirds of each thinned doubled back and fixed with sutures to heal, raw to raw to help piece out the vestibular hning

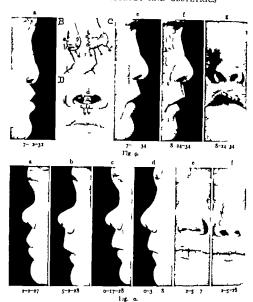
The nose as shown in e and f was accomplished by turn ing in : f' as partial lining, attaching the masal flaps I and Z sutured in the midline. The columella came from some extra width on the mestal border of Z, originally provided for that purpose. We have several times used this double flap where the forehead was wide but too low to furnish it in one piece (Fig. 32). The dorsal line of junction can, with careful cutting and suturing be made all but invisible. Where a nose is patched with an arm flap, the line is ant to be evident, less so if enough material was provided to allow a secondary adjustment.

e and f Show the final result. At recent steps a crescent piece was sawed from the mandible to shorten the vertical chin-lip length. Later the two halves of the lip were sepa rated. A folded arm flap was implanted into the midpart to give more than double the transverse width of the previously tight lower lip. At the time of transfer the rolled edge was left overfull to permit later an attempted reproduction of the natural slight ridge of the mucocutaneous function

This was accomplished in 8 major or minor steps done

in 514 years time.

A wider insert would have avoided the slight "V" at the right border



SERIES B DEFORMITIES INCIDENTAL TO A SHORT HASAL TUBE

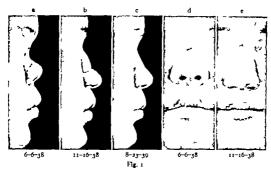
These deformities might be congenital, as in Figure 9, or due to infection, as in Figure 9, or acquired in growth, as in Figure 2. In some, correction might necessitat synchronous lengthening of the massi covering (Fig. 11)

Fig. 9. a, Cirl, aged 1: years, with columella and vestbular floor short, but with full vertical length of the doorsom. Correction required several very distinct steps. The first was accomplished by dividing the short columella from the lip and septum. This mubble of columella was fixed in a salvanced position, shown in b. In b, a roughly indicates

ining basis on the turn waved the flow of the restribute and attended will forward in such lateral wall. I be indicate the lower border of the als, of the original position of the columella. c. Wide undertuding permitted the border and lower part of the alsa covering to be moved downward and forward, with the resulting lateral defect in the bling, indicated by s'= a while the litherated stromp of columella was moved forward to s'. d. The haing defect as filled in with the ra lash of a sessilior stated lateral pathor flap, introduced through the noarth. After circulation was established, the prickles f.f. or drivided in the midfles of the four The columbia was later pieced out from the remaining palsar people. e. show the result of these implantations believe to the result of these implantations have not say between the register of these implantations have not expect brought the none or lay sufficient for the report of the register. The correct this, the ere columbias part freed from the septem, the columbia is the result of the septem. The columbia is the result of the septem of

This was done in seven operative steps, which for extrinsic reasons were extended over a years.

Fig. 10. A woman, so years old, had a flat bridge size childhood with history of ulcerations and repeated treat-



sents. a and c, Show addle nose and loss of vestibules fining, but downs! covering and columnlis of sufficient length abort nasal tube. Disregarding the presence of the columnits which was lacking in Flyure o, the plan of length ening of the vestibular floor and walls is identical with the exception that in Flyure o, d, the swallow tailed flap was introduced through the common nostril space while in this case if, was introduced sublability.

b. Shows the immediate result of the tubal lengthening shich for lack of cartilage support was but partially main tailord in the healing process (see c) but a secondary under making of the dorsum and the implantation of cartilage gave the result shown in d and f. The above procedures give about the limit of lengthening solely by additions to the liming. This was accomplained in 7 operative steps, major or minor, over a period of 15 months.

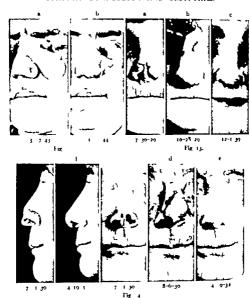
Fig. 11 Faulty postnatal development with shortening of both the donal line and the nassl tube in a man, 21 years old, a and d, Here the approach was through an external incision as indicated by the dashed line in a. The superficial tissues were stripped as far down as the dotted line, at which level the alse cardiages and floor of the vestibule were cut across. The lower part of the septum and the related soft tissues were mobibiled as in Figure 10. In Figure 0 the lining flaps were entered from below met at the dorsum and were wedge shaped. In this case, the lining flaps entered through the dorsum and met at the middline of the floor were cut across at the dorsum square-ended both above and below. The covering flap in b, came from earther up on the pedicke. Later developing sear constitutions were dealt with through the noatrils the need for the latter is less frequent after implantation of a forehead than of an arm flap b, Shows the condition several months later c and c. Views of the final result, show the donal line brought forward, accomplished by surface readplutment and dorsal implantation of costal cardiage. Four years later airways were reported satisfactory. A total of 7 oper after airways were reported satisfactory. A total of 7 oper after airways were reported satisfactory.

Split graft in forehead could be replaced with pigment infected full thickness graft.

#### PLAPS

There are three general sources from which the flap might be taken directly or jumped (1) the hair free regions of the forehead and face (2) the arm hand anterolateral areas of the trunk and the groin (3) pedicle flaps de rived from the nose (Figs 1 27 and 29) Of prime importance in the selection of tissue for a flap is the recognition of variations in the suitability intrinsic to the donor area. The outstanding characteristic of those taken from above the mandible is quality from below the clavicle is quantity. In hair free areas of the neck those factors merge but with qual ity still dominant (Fig 17) A more detailed but terse differentiation of aptitude is given in Table I

Human flap material is precious The surgeon will best serve the patient and himself by first making patterns from plaster-clay restorations of what he is attempting to re-establish (5 a) One that does not exaggerate the surgical possibilities serves as a usable working pattern helps the patient to visualize better the aimed at result, and gives some idea of the intricacies involved Even then it is hard to gauge the patient s buoyed up expectations. It is good practice to hazard the remark that the oper ative result will most likely fall quite a bit short of the model—unfortunately often true In faces both operated upon and not the natural color and mobile expression will ca mouflage moderate defects in contour which on the white cast stand out glaringly (9)



SI II C DI TRUCTIONEIN TIII TIP ARIA ETRE MONE.

1 ses of this type est blishment of breathing space is

usually an essential step. The mail flap can be taken from the arm, forebead or neck or jumped, his the hining may be supplemented by flay from the dorsum. Cartilage implantation may be pecusary

If it a. Traumatic loss of tip of nose month previous by iman S years old. a, I lap outlined laterally and undermined but the dirtal end us not detached the acrou to fore circulation, it more operativity experience for the considered and for trainer more perfectly and the considered and for trainer more perfectly entire the steps care necessary by it required one it has to some circulation with the continued of the continued of the continued for a fact flag. I the case I begin extra continued for fact flag. I the case I begin mittage the rather of the continued of the continued

Fig. 13. Het een the age of 3 months and 157 year, patient had ulterrations of undetermined eases a 4, how condition a cur first examination of the ext. 8 years of b, I cerchead thap was past does in place T has followed by the usual adjectaments. C Patient returned to year later. But improperation was done for the extra first position of the property of the part of the property of the part of the p

lig 14. a ndc Loss of tip of note from according to man 33 years old. A frinquier flap a few me to the left check ith the base: I the bridge of the new set of the bridge of the section o

There is room for judgment in each case but the secret bere hardly warrants repetition of the two-step operation.

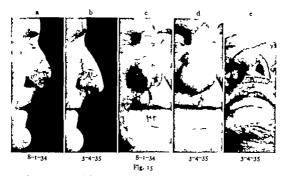


Fig 15 a and c, One year after loss of tip and columella narrowing of the vestibular floor and inspiratory collapse with airways obstructed in a man, 40 years old The repair was made in the standard way from a forchead flap but it lacked intrastitial support. b, The inhabitor collapse was controlled by undermining through incisions just within each vestibule, permutting insertion of thin strips of costal actillage with perichondrium, facing metally to cause a

slight outward bulge. Through incision made at each labial alar junction and undermining, a narrow stiff strip of cartilage was inserted which restored the width of the vestibular floor d and e

The result was attained in an major and minor steps in 6 months. We have through the same approach put in a single piece of booped cartilage, or a single piece for each side can be inserted through a short dorsal skin incision

Supraclaricular flaps To have the completely made nose of acceptably small size especially upon a woman the part of the flap that will form the alae and tip and be infolded for lining must be made very thin and at least 5 centimeters wide (Figs 16 and 26). This is often not possible on a woman's fore bead unless some scalp be included or taken as a bilateral double flap as in Figures 8 and 32. In older men however a receded hairline may become a blessing (Fig 15) (5 a 8 a)

Face forehead and small neck flaps can ordinarily be safely transferred after two pre-liminary steps (Fig 12 was an exception) (1) Make circumferential or both lateral in cisions leaving but a small artery-carrying distal pedicle undermine completely but avoid stripping the periosteum (2) After 10 days or longer but only after determining total absence of edema and the efficiency of the proximal blood supply by finger pressure on the distal pedicle divide the latter and suture (Fig 13)

With a well prepared forehead flap it might be possible and expeditious to thin infold and completely attach the whole nose at one sit ting However caution may dictate final thinning of the dorsal part only and temporary adjustment of the infolded part at the time the flap is first brought down. To insure a free vestibular airway without grossly in creasing contour secondary drastic thinning of the infolded part will ordinarily be required. The one step thinning and affixing operation is most suitable in making a large nose of an older man where the blood supply is usually generous. For small noses the two-step application is almost mandatory

A forehead flap with a temporal pedicle is poorly adapted to make a complete nose but can be used for dorsal covering lining (Fig. 6)

or patching the cheek (Fig 23)

Infractarcular flaps Arm or body flaps should be raised in at least three stages spaced at proper intervals (1) Make but one lateral incision at a time preferably full length down to the muscular fascia and undermine in that plane more than one half way across the proposed width (2) 10 days to 3 weeks later make the second lateral incision and complete the undermining (3) after a similar interval or longer cut half way or completely across

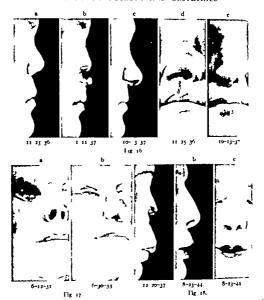


Fig. 6. A man, ased 13 years had been injured all phase or in 1 following in 8 and mendered nastal fresture tartilage and 1907 insplant had been introduced some seeks later. Now as a remoded, olumelia retreated and already obstructed a and di Condition at our first cam ination is. Used local assessibility, the lower lateral artilages, related mescous linking and establish flow scars were removed. The base of the cohemelia was released and flags of alar akin ere implanted in the flow defect, thus ad and columelia. The lower burder of the assal covering and observant the topic part of the base and the study of the assal covering a survival of a turn-down hinding flag.

The flower burder of the assal covering a survival of the study of the study of the desired covering and the estimated to appear the the forestend flag.

The major or minor steps were done in 8 worth's time.

Fig 17 Healed burn from gasoli explasion a years previously in man ged 37 years. Condition t our first camination i abown i a. An outlined upper neck subsectal, left submaniflary flap, ith base at right facial ritery for axad reput 1 partially shown by the released lines in b. Completion of the ont. The door set at the acch we gratified. Incidentally the exercise service for led was released. This and the check make for correing of the right; per cy fill as made from the correing of the right; per cy fill as made from the case of the right; per cy fill as made from the case of the right per cy fill as the completion of the right per constitution of the right per cycle of the right pe

period of 2 years 1 restore cyclins and now.

The R. a Condition after excellent and now.

Cherk and now for greatly detected by subantions, as a comman 23 years old. The solution covering of the soil below was turned down in one and siffer the central soil to the solution. The solution is the soil below was turned down in our and siffer the central soil to the soil of the so

the distal pedicle and if circulation warrants the nasal covering part of the flap might be thinned and put up at this time. Never cut across the distal end until the flap has ac quired an adequate circulation as proved by pressure test. Venous engorgement can cause gangrene in a pendant flap in spite of a gener ous blood supply

At some step the pedicle of a long arm or body flap might be partly or wholly tubed or the raw surface of both pedicle and bed can be covered with split skin grafts at this time except the area to which the excess of pedicle will ultimately be returned. It is desirable in the original planning of a flap to allow for proximal lengthening should a par tial loss occur at the distal end (Figs. 30 and 31)

For disproportionately long and narrow flaps on the trunk or neck sectional tubing interrupted by temporarily retained attach ments to insure immediate blood supply is a practical plan These supply bases are later detached and tubed consecutively

With a forehead flap where the pedicle comes from above a few tacking sutures are sufficient to hold the transplant in place but to compensate for the pedicle drag of a flap brought up from below we use one row of buried very fine white silk sutures on either side so placed as to give some up-crowding when tied with a superficial row of fine sutures to insure accuracy of skin approximation With a forehead flap the buried sutures might be omitted. In either case, the superficial sutures are of black silk the knots are not drawn sufficiently tight to leave marks and might be removed in 3 days. These are re placed by a one-layer patch of gauze affixed with flexible collodion. A heavy skin suture deeply placed at the lower end of the alar bulge may be used both to fix and shorten the vertical base of the bulge which will tend ultimately to give a more natural lateral full ness to the ala.

The weight strain is further eased by a gauze strip fixed to the skin with fresh flexible collodion lengthwise to the pedicle below and above to the forehead. If into this traction line a section of elastic rubber band is introduced the lift will be more uniform

#### DIFFERENTIAL CHARACTERISTICS OF SUPRACLAVICULAR AND INFRACLAVICULAR

FLAPS TABLE I -

Flaps taken from face or neck

InaN I Hair free donor areas may be embarrassingly limited especially on the forehead of a woman or

the neck of a man a The scar of the donor area is always in sight, though this can be more or less camouflaged by skin graft and intrader mal injection of color Try to avoid a forebead defect on a woman.

Flaps taken from trunk or limbs

AHCan be made almost any size

A. Body hair may be entirely negligible Most donor sites are

hidden by the clothing 3 Certain of the objec tionable factors cited below in the inant group do not hold true for flaps taken from the front of the wrist or bor der of the palm Both are hairless and the lat ter is of good consistency and color and does not shrink. These latter can be particularly appropriate for certain small repairs such as restora tion of a columella or

The forehead flap is intrinncally the more de strable. It is relatively firm in substance with just sufficient elasticity to retain some spring making it self-support ing When lolded to a sharply molded form it will shrink very little in healing or subsequently

. The constituent lavers are rather uniform in thickness and consistency which facilitates symmetry of molding

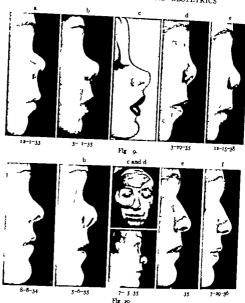
- Total blood supply is relatively greater and more easily trained to a narrow pedicle with ordinary precaution hesitancy of healing or slough is rare but can pribben
- 4 Th basic blush color will pensist or be early
- Flaps taken from other nonhair-bearing parts of the face will ha about the same qualties but of necessity will be much ama flor

Інарі

an als.

The tissues are relative ly flabby and, with the exception noted above unless supported are apt to shrink t an embar rasung extent

- 2. Such flam lack definite cleavage planes and closely adjacent areas may vary greatly in skin thickness and in the quality of the under lying turne all of which tend to negate both symmetry and sharpness of molding
- The total blood supply will average less, its sources are more diffuse. a greater number of operative steps may be required to establish an efficient pedicle, or even one of doubtful value
- In flans taken from be low the clavicle the basic red is deficient or absent however this can be at least partially com peneated by suitable injection of color intra dermally but will yield no variation in bl sh
- 5 The body hair may be negligible or so profuse a t require surgical depilation control with chemical depilatory scietors or razor



REBIES D. RESTORATION OF UPPER PART OF HOSE

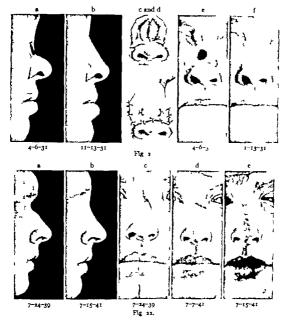
The cases selected for this and the following sense sine even greater emphasis: t be becausity for care determination of the real extent of loss or distortion and the mode and possibilities of repair before correction is instituted. Detortion of usable tissue should be entirely released before the flags are pot in place yet the preparation of delayed the control of the potential of the potential of the control of the control of the potential of the potential of the these real. We present the control of the control of the destination, corrected to an extension of the control of the deleast partial solution to the what and the how of this dilemma (see Figs. o and not of 5-b).

Forthead flags abould be cut wy exact. With unrestrained mulcialevaluar flags, an illustrate abould be made ( a shrinkage. An incidents around the cut made ( a shrinkage. An incidents around the cut made to the pass that it may be difficult to estimate bow much addition to any cyrello or its foundation will be really ecided. Here an overconvection can be dealt with by simple excision, while secondary additions are apt t be as complicated as the original implantation (Fig. 3)

Fig. 10. Subdiscoser loss of vestible integrand on mells in vestible the latter of the second section of the second section of the second section of the second section of the latter of the section of the second section section of vestiblater finding after undermining up t the pinche for vestiblater finding after undermining up t the pinche of write thap as used t make the columnia. Comments able one for certain faces d. The patient was attacked as the section of the period of the section of the s

were required over period of almost 5 years.

The first blunder was not resting in what, as sub-factory to the patient. The second as that bringing is ward the bridge of that tilted nose upset facial lakes? It will be the compromise it tempt to steal narrow covering.



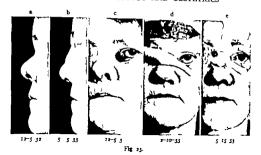
and faing flaps from just above the brows in the hope of avoiding a gratified forehead. The flaps obtained were too harmow to give proper length to the dorsum and under uning of the forehead tissues to above the halffire failed to prevent drawing up of the brows. This latter gives an apparent overlengthening to the dorsum of a still turned up hope a givenous error

Fig. 20. a, Saddlenose, the result of an unreduced fracture 12 months previously in a soman 70 years old. b. Mitempted correction by intransaci chies-knobulazation and ire frantion a first give promise of being acceptable but with subsidience of the postoperative swelling, the fact of bony fination, these to no early removal of wire, permitted a progressive distortion, as shown when she returned to months later. Adequate fination for a sufficient period should give unlow where there is any bony contact. The manning was the same there is any bony notices to be made and the same significant of the manifaction princips below. This can be retained for 3 months if necessary c and d, As accordary attempt, the vestibular portion was completely secreted from the bridge by transverse incision, see G. Subsequently the natural dorsal covering was turned in to lare

the defect and the whole was covered with a previously prepared forchead flap that had a temporal pedicle shown in d. c. As with our first attempt, the immediate result appeared to be quite satisfactory but 7 months later the lower part had slipped backward, as seen in a similar case F gure 1: b 1 Final result was further beighed by implants too of costal cartilage into both the downum and columella. A total of 3 operations with 3 fallures due largely to lack of sustained postoperative fination of the mobilized mass, was required over a period of 3 years.

Fig. 2 a and 2, Headed result of extensive cauterization

one 345 years previously on a woman aged 39 years. The dashed marks on e Indicate the source of the lining flaps. The dashed marks on e Indicate the source of the lining flaps. The flap tunned in to give a ridged lining to the were undermined, turned in to give a ridged lining to the previously depressed dorsum. The surrounding tissues were further undermined to widen the bed for the covering flap of The forehead flap was put in place with the dorsal ridge maintained by temporary mattress suture. b and f. Result shown 6 months after completion of the correction (8, c). In this case 3 operative steps were completed in 7 months time.



Small patches of adhesive plaster prevent the cutting in of this necessarily tight mattress suture. Gauze wads used for this purpose might cause, ecrosis.

Fig. A man, o years old subglabellar fracture displacement from alpiane crush. There were imprigament on the nasolactional grooves, prof displacement of the left inner canthus and supportation of the form of the acts of the control of the left inner canthus and supportation of the cambridge of the section of the acts of the control of the cambridge displaced bone of supportaling as expectationing of can thus first by transmand so day yet instruct. Overcorrection will subside after gut loop absorbs. d. The superimposed diagrams undicate the report flap and also the position of use The displacement of the right inner canthus as partially corrected at this time by burded sture. b and e, Final result. This required but operative steps with e, versal intervening.

The right time continue could have been brough I further mostally. The forthead effect is an overcome sensity by wide undermining and sature. The resisting uptile of the inner end of the right been could be further corrected by a "2" flap operation, but the patient shield to avoid this additional step. We have seen several such injuries doe trife wounds in soldiers. If both eyes were I tact, the man was grateful for the correction, but where one eye had been distroyed, he was apt to complain of the resulting narrow ed visual range of the remaining eye.

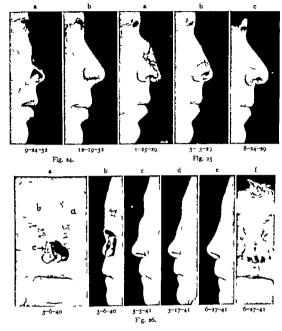
Fig 3. Ulcerations of face, mouth and pharynx, starting so years previously in a woman aged 43 years. a and c.

The use of the inframandibular or infraday icular flap gives no choice but for at least a two-step operation for affiring the flap attachment and final molding. Only the dorsal at tachment with corresponding thinning can be done at the time of transfer. The special thinning for the columella and alar infolding is of necessity postponed until after establishment of the new blood supply and the division of the pedicle (Fig. 31). The vestibule is lined and the columella formed by infolding

Saddlenose perforation theme can be, not lead to the perpending to the cheek, causing a distortion of the licentending to the outer can have \$A\$ too narrow and its port forcebased flap with right temporal periods as or The dutal end was split. The cheek car had been oranged as far as indicated in d, which was not far except Xad lining was obtained from the lower part of the fap. In auditions upper part better partially alleed the complex and lining was obtained from the lower part of the fap. In audition, the period of the letting down of the near \$A\$ that is the the feedback while the mental portion filled in the defect reading for the letting down of the near \$A\$ that his the reasons raw area as graited. The tarms is will not in his construction of the fap. I was also the the f

months. The primary fault here as naking the forebast faple short and too narrow. A longer fap. will star possible or opening of the full length of the cost them to the greater width sould have brought days the property of the property primary factors and the star of th

of the extra length of the masal flap already provided for this purpose (Figs. 1 c and 18). In a nose intact above the vestibule asy needed lining can usually be derived from the original dorsal covering but no a total restoration an extra flap may be needed (8,a). It may be desirable but more frequently not practical, to make the columellar infolding sinde enough from above down to admit later a cartiage from above down to admit later a cartiage mon to total noses thus made (Figs. 20,1-26).



SERIES E. SUBTOTAL RESTORATION OF THE NOSE

Usually a sufficient amount of the nasal framework remains. In certain cases, restoration of the dorsal fine can be more easily attained by bone cutting than by cartilage implantation, but both might be used in a given case (Fig. 50). In all restorations, whether great or small, integrity of the fining is as important as the covering Restorations after total loss are done on the same lines but an extra small flap or garf may be required for fining of floor dor

sem, or both (co and &).

Fig. 24. a, Subtotal destruction of the nose by cancer
parts, in a woman 35 years old. b, Result 12 days after
repair with forchead flap for covering. The lining came
from turning in the remaining dorsal tissue. Repair coupleted in four operative steps over a period of 3 months.

Here a forchead flap gave a good dorsal line without

other support.

Fig 35. Auto accident caused subtotal loss of bone carillage and covering in this 17 year old girl. a, A lesser loss than in Figure 24. Note the now too prominent re

maining part of the boay bridge. b, Result of chaeling of the hump and approximating the bones before tunnier of the repair flap. c, Repair with an arm flap. This gives a rounded tip, characteristic of a repair with almost any subciavoular flap (Fig. 17) as distinguished from a forehead flap repair (Fig. 14 and 50). This required 8 operative

steps, major o minor, in 6 months.

Fig 40 Healed mibotal cautery destruction of the external nose left antral wall, cheek and lower eyelid in a
soman, 60 years old. a and b, Repair made with flags, a,
b and c. At intervals, the left forchead flap was sutured
into the freshened cheek defect with the mestal edge being
turned in also to supplement the nasal fining of that side.
At the primary raising of flap c, the lateral Inchiso was
made to the bone for right cheek fixation. c In molding
the rose, flap c was rotated to piece out the hing of the
left side, b furnished dorsal covering and vestibular infold
ings. With the settling of this soft itsue rose there was
sinking of the lower part of the dorsal line. In the case in
Continued so fellowing layer.)

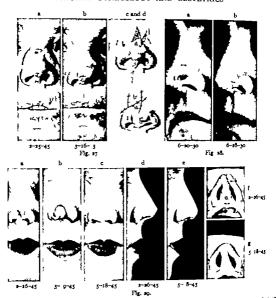


Figure 3 this prominence had been removed before the covering flap was brought down. Here the upper part of the flap was turned down and the body prominence trimmed, but preserving the mucous liming without appear imating the must boose, with the result above in d. and I Later cartilage implantation into both the downm and columnils further supplemented the inching framework.

### THE MASAL TIMEVES

Three cases re-cited to libestrate instances of this sort. Fig. 79, a. Distorbios of the near farmes over from children induced to the near farmes over the concinition of the control of the control of the concinition of the control of the control

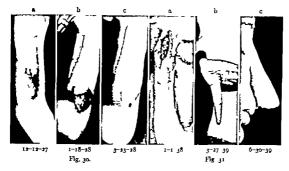
Transfer of flaps No flap should be transplanted while (1) any patent edema or indur

Fig. 88. History of full thickness radiom destroom done o years previously in this occan, 55 years all a. Defect, dotted like indicates trapdom far that returned in for licing b, Raw surface of noce are hard racovered with previously prepared forched far A simpler plan might have been one using a free postumi.

skin gralt in place of the correing flam.

Fig. 20, 4, d and F Rollind destructive sheers he childhood with complete excluding discovering processing the left vestificity. In our stylent skil, it is destructive, a better better flam and year skil. In the sheet coulding, a bester he flam nisted from the wide profits of the former need for perfect. It is a flam of the former need for perfect. It leads the distinct of the former need for perfect. It leads the distinct of the flam of t

ation persists, (2) the patient is in a poor grieral condition, or (3) there is skin infection,



#### SERIES G. ARM FLAPS

Given a sufficiently bare area, a forehead flap may be cut to the desired size with little or no allowance for shrinkage (Fig 1 a) but for the arm or body flap (Fig 1 b) there is not only a natural tendency to shrink, for which some allowance should be made but the weight of the pendant pedicle tends to elongate the latter at the expense of width so that what at first appeared to be ample may have to be supplemented or the whole transplant discarded. It is for this reason that we cut an arm flap not only wider than apparently needed but make the pedicle even wider than the lateral extensions for the alae (Fig r b) The extra weight also demands more meticulous suture or an overlay of the borders of the flap to be adjusted later Supplementary elastic support of the looped pedicle by rubber band traction, anchored to collodion-affixed gauze patches, will greatly alleviate weight strain at the suture line

For comparison of adaptability see Table I and Figures 30 and 31

Fig 30. Sloughing arm flaps. Reactions still four-plus after four previous courses of treatment. Nose operation was uneventful after usable flap was secured (See discus-

non of case in Figure 10)

a, A diffuse alough in an inner arm flap after making both lateral incisions and complete undermining in one step. The flap was abandoned on account of diffuseness of the slough. In several of our earlier cases, with success attri buted to "foot's and beginner's luck, we raised large arm

but a proper delay will likely eliminate the difficulty 1 No flap should be transplanted the circulation of which had hesitated suffi ciently to cause blebs, deep discoloration or diffuse gangrene Such a flap would most likely not survive both thinning and transfer (Fig 30 a) We would consider worth while the attempt to use a flap that had suffered a sharply outlined distal loss from a frank gan grene provided the flap was still sufficiently

Amoderate activity of chronic across that frequently follows—train tri-or other meidental irregularity can assume be quieted and the patient made exercise by one exposure to radiation. I proper length and intensity

flaps in two steps, but a good routing is a minimum of three

b. Sharply outlined slough of a flap from the outer sur face of the same arm after incising and raising the flap in two steps, but still without dividing the lower pedicle Because the slough was sharply outlined and limited to a distal fourth, the flap was nursed along until it had completely healed without any suggestion of change or im paired circulation c, Spontaneous drawing in and healing of the damaged area, when the flap was successfully used with no hesitation of the circulation. Subsequent observations have forced the conclusion that in this and other losses, the fault was with the plan and not the tissues. This is also emphasized in the case of Figure 31 in which there

was no blood dyncraria.

Fig. 31 Partial raising at two sittings. At the time of application, circulation in the flap appeared adequate but it sloughed following implantation see a. b, Flap was taken down and allowed to heal with good circulation throughout the remnant. Fifteen months later with some secondary lengthening at the base, this flap was again put up, b, with no hesitation. The skin graft repair of the arm, shown in h, was done while awaiting recovery of the sloughed flap.

In c the transverse division of the healed in-place flap was at the level of the mouth slit. Higher than that is not safe as shown by the shortening which occurred after releasing the weight of the pedicle. (For discussion of case see Fig.

long or could be lengthened (Fig. 30 b) After a second hesitation the flap should not be used Forced abandonment of a flap at any stage is an embarrassment to the surgeon and more so to the patient. However loss of a transplanted flap is a catastrophe (Fig. 31)

Correction of deformities resulting from trau ma or disease. The first move in the repair of the donor area is the return and adjustment of the unused pedicle. After this has been transferred and the desired surgical correction made the remaining deficiency at the donor

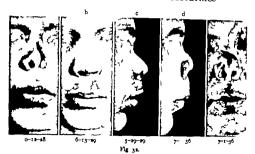


Fig 32. This case emphasizes the need of continual postoperative caution in any congenital or acquired infection.

Nasal and threat telementous for a years previous to recognition of the cause. Recent treatment of this po year old man had brought his blood reaction down from four to two-plus. a At our examination be had scarring of the pharyan and palate, internal nasal destruction and some full thickness loss. Medication was discount ed for a

site should be eliminated Granulating or rough scar must be camouflaged or hidden. The borders of small defects might be under mined and approximated, while others must be grafted. It is hardly practical to use a full thickness graft at the time of flap transfer A solit graft might be less conspicuous if drawn tight over a t or a week old bed of smoothly trimmed granulations as is our common practice on the forehead. On the trunk, residual disfigurements can be hidden by clothing which is also true of a man s arm. In a woman an arm flap should be taken preferably from the inner surface she can quickly acquire the habit of holding the damaged area close to the chest which makes a smoothly grafted area quite unnoticeable.

It is the exposed donor area of the forebead or arm and repair tissue that does not blend with the surrounding color that chiefly at tracts attention. It is very seldom that an infraclavicular graft or flap will have any of the natural facial blush after transfer but it may become more tanned than natural. No matter how perfect the technique, a marked color discrepancy will vituate an otherwise period before operative correction has undertaken, seour custom. We used to of orchead flage, one for listing to our four covering (Fig. 8). After these had healed in placto, we have been for rest and further intensit treatment. Latter is inserted cartilage graft into the derson, will be result shown in b and C. The length of their trusters was continued after cartilage insertion is uncertainty of returned y years latter with the weekage. Mach is about

quite acceptable result. Most women but for men will use cometics or surface stams. The natural red comes from the depths of the size and surface applications are but easily detected substitutes that lack the rue base coloring. To match free skin grafts and pedie flaps more nearly with the surrounding skin pigments can be instilled into the dema of transplanted skin with fine needle point (a)

On the forehead, the original split graft is later discarded for an evenly fitted full thek ness graft which is allowed to season before intradermal color is injected. The natural changing face-tinges are live and these cannot be duplicated even by color instillation, but this method is still our best substitute. The tenacity with which the transplant dings to the color characteristics of its source suggests the possibility of some intrinsic local control. For example, grafts and detached transplants taken from below the clavicle will in most instances, eventually lose all vestige of red, while flaps from cheeks or forehead, also pertaural grafts, will retain or regain their ast ural blush shade

#### REFERENCES

- 1 BLAIR, V P J Am M Asa. 1921 77 1479
  2. Ibid., 1925, 84 185
  3 Ibid. 1925 85 1931
  4. Idem Surg Gyn Obst., 1926, 42 128.
  5 BLAIR, V P and BROWN J B Surg Gyn Obst 1931
  53 79 (a) Fig. 352 and b (b) Figs. 2 32 and b
  (c) Fig. 4.
- 6. BLAIR, V P., BROWN J B and BYARS, L T Surg
- 6. BLAIR, V. P., BROWN J. B. and BYARR, L. T. Surg.
  Gyn. Obsl., 1039, 56, 358
  7. Idem Ann. Otol. Rhinol. 1037, 46, 302
  8. BLAIR V. P. MOORE, S., and BYARR, L. T. Cancer of
  the Face and Mouth. (a) Fig. 31 of Plate 13, (b)
  Plate 30, (c) Fig. 55 of Plate 10, St. Louis C. V.
  Mosby Co. 1041
  9. HACC., G. BROWN J. B. BYARR, L. T. and Mc.
  DOWRLL, F. Surg. Gyn. Obsl. 1044, 79, 624.

# OBSERVATIONS ON THE TREATMENT OF ADENOCARCINOMA OF THE UTERUS

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N the past 3 years, 10 women with adeno-carcinoma of the uterus, comprising o 5 per cent of the patients on the gyneco-logic service have been treated at Walter Reed General Hospital These cases are presented without 5 year follow up for two reasons residual carcinoma was found in 6 of the 7 uteri which had received enormous doses of radium by means of the hysterostat designed by one of us (M F) and the presence of ovarian metastasis in 3 patients emphasizes the necessity for oophorectomy as part of the treatment.

Recent reports have suggested that panhysterectomy with bilateral salpingo-oonhorectomy should result in a 5 year arrest of 60 to 65 per cent of operable lesions (4 11) The impression that the 5 year survival rate may be increased to 70 or 80 per cent by the use of preoperative radium followed by hysterec tomy has been growing during the last 10 years. The majority of recent authors have advocated this combined method of treat ment. Because small doses of radium in the order of 1 500 to 2 500 milligram hours have relatively little effect on adenocarcinoma of the uterus conclusions drawn by authors who employed these small doses are of questionable value. The few reported cases treated with 4,000 or more milligram hours of radium are inadequate for a correct statistical evaluation of the combined method of treatment.

Conscaden (1944) reported 25 cases in which patients were treated with radium and hysterectomy in which the 5 year survival rate was 72 per cent. He recommended 3 000 to 4 500 milligram hours if given in one massive dose. Sheffey (1943) reported 30 cases in which patients were treated with

From the Waiter Reed General Hospital, Washington, D.C., and the Women. Surgical Section and Radiation Therapy Section of the Surgical Service and Pathology Section of the Laboratory Servica. combined therapy in which there was 34, per cent survival after 5 years. Only 9 of the 30 patients received doses of 4,000 to 5,000 milligram hours. In his cases of patient treated by surgery alone, the 5 year surviul rate was 18 it per cent.

Ward (1942) reported 37 cases in which combined treatment had been used with 648 per cent 5 year survival as compared with 659 per cent in 27 cases in which surgery slow was used. The radium dose varied from 2,000 to 4,000 milligram hours, followed by post

operative x ray therapy

Heyman (8) in Sweden (1937) reported 5 year arrest of 78 5 per cent of 65 cases in which treatment consisted of hysterectomy followed by radium and x ray therapy in 1941 (9) he reported a series of 402 including inoperable cases in which patients were treated with radiation alone, with a 5 year survival rate of 40 per cent. Included in the group were 156 clinically operable cases a which patients were treated only by raduation and in which the 5 year survival rate was 48? per cent. He did not employ the combined treatment of radium followed by hystered torny except in one subgroup of patients, who were operated on after radium therapy had failed in this group the survival rate was 46 per cent. The usual radium dose was 3,000 milligram hours delivered in two applications of 1 500 milligram hours at an interval of 3 weeks.

Brindley (1941) reported 24 cases with 79 per cent 5 year survival. He used the cambined treatment. The radium dose runed from 800 to 4,800 milligram hours, averages 2 600 milligram hours.

Miller (1940) reported 34 cases in which treatment consisted of radiation followed by surgery The 5 year survival rate was 74.5 per cent. Although he recommended preoperative x ray therapy only the exact number of patients so treated and the dose were not mentioned

Morton (1930) reported 18 cases in which the combined treatment produced a 66 per cent 5 year cure. Thirteen additional cases in which surgery alone was used had a 69 per cent 5 year survival rate. The dose of pre operative radium was not specified.

Healy and Brown (1939) reported 28 cases in which 3000 to 4000 milligram hours of radium was administered preceding hysterectomy. The 5 year survival rate was 70 per cent.

Ameson (t 1936) treated 10 cases with radium followed by hysterectomy to obtain a 5 year survival rate of 90 per cent. The dose of radium varied from 1600 to 4000 milli gram hours, 6 patients receiving more than 3000 milligram hours.

These published reports of a relatively small number of cases have been influential in determining the present trend toward combined therapy. The statistics in themselves are not conclusive. The recognized abilities of the authors however demand that their opinions be given careful consideration. Presumably, there are favorable clinical impressions of individual patients salvaged by the combined method which are not entirely reflected in the statistics.

In 1934 Sampson warned that a straight radium tandem in the uterun convity failed to irradiate the uterun homogeneously and that carcinoma localized in the cornu might be unaffected. In spite of his admonition the straight tandem continues to be widely used. Other methods of using radium in the uterus include multiple packing of loose capsules with strings attached or incorporation of capsulesing against pack (2). The capsules have been attached to wires (4, 5) in an attempt to fan out the radium. Several other devices have been designed (10, 16, 18).

#### RADIUM TECHNIQUE

The radium applicator which is called hysterostat was designed to achieve a more equable distribution of radiant energy to all parts of the uterus. Its construction was based on the following features:



Fig. 1 Dagman illustratum; intensity of radium energy distribution around platinum capsule. The greatest intensity is found along the side point A. The waket in tensity of radiation is located at point C which lies obliquely off the end of the capsule. A period hearn of weak radiation consendirective off the end of carsule to point B face Fig. 3).

I Study of the distribution of radiation energy around a radium capsule with a wall thickness (filter) of 1 or 15 millimeter of platinum reveals certain data of utmost importance to successful use of radium in the uterus

a. The greatest intensity of radiation is found along the side of a radium capsule (point A Fig. 1) due to a filtration factor and a distance factor Most of the rays emanating from all points along the radium source travel obliquely through the metal wall of the capsule to reach point 4 The longer path through the wall of the capsule which the oblique rays must traverse subjects them to in creased filtration in the metal wall. However this increased filtration is at a minimum for point A as compared with all other points equidistant from the outer wall of the capsule (point C for example) In addition, the average of the distances which the rays traverse from each point along the radium source to reach point A along the side of the radium capsule is shorter than for point C or any other point equidustant from the wall of the capsule

b The weakest intensity of radiation from a linear radium capsule is located at a point obliquely off the end of the capsule (C Fig 1) because the average distance which the rays, from each point along the radium source travel is longer than for point A Furthermore many of the rays traveling obliquely through the wall of the capsule to reach point C must traverse eight or more times the stated thickness of the metal wall before emerging from the capsule. Thus the high filtration considerably decreases the intensity of the total radiation reaching point C

c. Radiation coming directly off the end of a linear radium capsule to point B in Figure 1 is filtered only with the minimum stated filter of 1 or 15 millimeters of platinum. This advantage is neutralized by the fact that the average distance which the rays traverse from each part of the radium source is the longest of all the average distances. As a result, a natrow pencil of increased

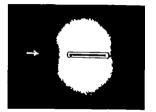


Fig. 1 Actual picture of radiation intensity distribution made by placing a radium capsule against an unexposed film suspended in air. The radium element source is centimeters long and the wall of the capsule is 5 mills meters of platinum. Note the great i tensity furalisation storage the side of the radium capsule, and the equally striking weakness of the radiation counts of the red of the label of the radiation counts of the red of the label of the radiation counts of the radiation counts of the radiation that the long radiation counts of the radiati

radiation intensity comes off the end of the capsule (see arrow Fig. 2)

- d. The great intensity of radiation along the side of the radium capsule, and the equally striking weak ness of the radiation coming off the end of the capsule are illustrated in Figure : These facts are significant when the unsue to be irradiated comes in direct contact with the radium sources, in the treat ment of convence carponers.
- 2 When several capsules are placed per pendicular to a surface the intensity of radiation reaching that surface will be rel attively small. In Figure 3 although 2 capsules are pointed at the cornu it receives less radiation than those parts of the uterine wall in direct contact with the sides of the capsules.
- 3 For effective radiation of the fundus of the uterus one or more radium capsules must be flat against it Several tandems or individual capsules pointing at the fundus per pendicularly will not provide comparably effective radiation. The crosspiece of the hysterostat permits proper placement of radium against the fundus (Figs. 4 and 5) and can be adjusted to provide contact with a concave fundus (Fig. 12).
- 4. Studies of energy distribution around radium sources, according to the Paterson Parker dosage system for gamma ray ther apy' (14) indicate that radium sources should be placed pempherally around an area which is



Fig. 3. Self exposed photograph saids ith lysematic containing 6 radium expusies, as in Figure 10 the thetical technocanal by continenters long. Although the cappiles are polaried at each coren, the caines of pasilion intensity in the cornu is readily apparent. The healt importations is effectively irradiated by the continent of the midpoint of the triangle in the continent of the triangle is the continent of the continent of the continent processary.

to be homogeneously irradiated, within certain spatial limitations. The addition of multiple sources within the center of this area (packing a uterine cavity with multiple radium capsules) serves to increase the intensity of radiation within the center of a cavity when it is already high (Fig. 3).

5 The hysterostat is constructed of multiple sections which can be screwed together in the operating room after the contour of the uterus has been defined so as to produce is roughly triangular distribution of radium sources within the uteruse cavity. Each section in the length of a single radium crisis Sections in two angulations (170° and 167) are provided so that a uteruse cavity of shoot any size or irregular configuration can be fitted (Figs. 5a b c). The crossplere (Igs. and 5) is so arranged that it can occup for different predetermined angles in relation to

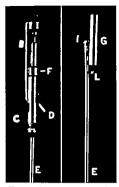


Fig. 4. The crossolece. The handle end is on the left, the radium end on the right. The flange, B is attached to knob only and stides into the limiting alors, D in the revolving sleeve C. The flange must be pulled below the fixed guard, F before the sleeve can be rotated. E. Tubular stem through which runs the central view.

At the radium end of the crosspices is the shell, G which can be unacrewed and a radium capsale inserted. This can be made any desired length by adding extra straight or anyolar pieces. The shell is attached by a hinged joint, I to the end of the tubular sterm, E. The central wire emerging from the tubular sterm is attached to one end of the shell by means of an axis g joint L.

the supporting stem. Four side-pieces are provided but only two of them are needed except in unusually large uteri

The sheaths which contain the radium capsules are constructed of monel metal tubing with a wall thickness of 0.4 millimeter which provides an ideal secondary filter. These sheaths can be constructed to contain radium capsules of different sizes. We have employed two sizes, 4 by 23 millimeters and 6 by 18 millimeters.

6 The radium dose which we employ has been arrived at by empirical means. Calcula tion of the distribution of the radium energy to various parts of the uterus in units of gamma roentgens has not yet proved to be of practical value in ascertaining the desired radium exposure of a particular uterus under treatment.

The individual capsules contain 10 or 15 milligrams radium with a primary filter of 1

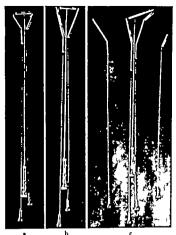


Fig. 5 Crosspiece and lateral tandems arranged in 3 different hypothetical distributions. a, Arrangement of 4 capsules in a uterine cavity 5 centimetres long. One lateral tandem is angulated by bending the flat stem. b Arrangement of 6 capsules in a uterine cavity 7 centimeters long ment of 6 capsules in a uterine cavity 7 centimeters long. This has been accomplished by inserting an extra section into each lateral tandem. c Arrangement for a large it regular uterms cavity. The additional 2 lateral tandem are available in case a large uterine cavity can accommodate them. Note that each arrangement of the applicators provides one radium capsule in the cervical canal.

or 15 millimeters platinum and a secondary filter of 0.4 millimeter of steel A dose of 1 000 milligram hours per capsule is given when the uterus is normal in size A small uterus with a cavity 5 centimeters long holding four capsules will receive a total dose of 4 000 milligram hours given in one treatment. If the uterus is larger and contains more radium capsules the individual dose per capsule is from 700 to 1 000 milligram hours. The total doses in this series ranged from 6 000 milligram hours to 12,480 milligram hours.

Generally when the uterus is larger than normal and the total dose is to exceed 5 000 milligram hours radium is given in two treat ments at an interval of 7 to 10 days. The



Fig. 6 Case t Blopsy before -ray therapy This growth is classified as a moderately undifferential red above carcinoma originating in the endocervical glands. The tendency to form liveola struct res is clearly shown. X61.

uterine canal usually shrinks and its shape changes after the first treatment so that the rational treatment is the second treatment.

This technique had been employed in 28 cases by one of us (M F) in civilian life prior to 1942. The radium exposures in half of

these ranged from 6 000 to 10 230 milligram hours. These cases will be the subject of a future publication

Several other devices have been designed for the purpose of obtaining diffuse distribtion of radium energy throughout the items. Schmitz using a Y shaped applicator administered doses up to 6 coo milligram from. Kaplan employing a ring applicator administered doses ranging from 6,000 to 7,00 milligram hours.

#### CASE REPORTS

Case I Moderately undifferentiated adencer cinoma of the cervix, slightly advanced.

A moderately well nourished white featie, and 30 years was admitted to the hospital Spremberl, 1944, complaining of intermensitual bleeding in months. She had one child aged 17 and had had or miscarriage 2 years ago. Memses were regular very 28 days lasted 7 days, with moderate for und pain. Six weeks before admission the patient savel a mass protruding from the vaginal onfer, its disappeared when she lay down.

On examination, the abdomen was flat and set, with no masses or tenderness. The vagion was on mal. Protrumeters in diameter with a red muscle surface which bed easily. The uterus was of tusual size anterior and free. Ovaries were zone. There was no induration in the torout legisler.

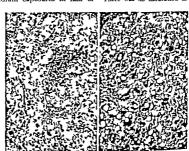


Fig 7 Left, Case Biopsy 8 days after x-ray treatment started (3 days after completion of tumor dose of 3,000 delivered over period of 5 days). There are slight to moderns radiation effects, predominately never hyperchromatism and to less extent cytoplasmic as ell-

ing X70.
Fig 8. Case Another area of section shown in Figure 7 Here the radiation effects are much more striking. X70.



Fig. 6. Case r. Entire uterine cavity showing granulating endocervical surface at site of tumor. The upper portion of the corpus appears relatively normal.

Blops, of the endocenycal tumor showed moder attly undifferentiated adenocarcinoma (Fig. 6). Supervoltage x ray therapy was given with ravs activated at 1 000,000 volts over a period of 15 days activated at 100,000 volts over a period of 15 days. The skin dose ranged from 1,000 ft or 5 gor to each of 6ve skin portals. The tissue dose delivered to the tumor in the cervix was 3,040 r.

Three days later (18th day after initiation of treatment) the cervical tumor had shrunk about 20 per cent and measured 4 centimeters in diameter. The uterine cavity was curetted and the tissue 30 being proliferative endometrium. The cervical tumor was excised with endothermy A radium tandem composed of 3 platinum capsules totalling 60 milligrams of radium was introduced into the uterine cavity, and three cork, each of 15 milligrams radium were placed in the vagina about the cervix. A total dose of 8 000 milligram hours was given.

Microsopic examination of the cervical tumor (Firs. 7 and 8) revealed in response to 3 030 r extensive destruction of tumor cell. Those remaining howed moderate to marked changes pred minantly nuclear alteration—and to a lesser degree swelling and vacuolation of the cytopla m.

Sixty five days after railium abdominal pan hysterectomy and bilateral salpingo-on bottertomy were performed the Richardon technique being used. The peritoneum and intestines were remained allowed to reduce the mentaged lymph nodes or induration were present. The uterus was small and attrophic (Fig. 9) as were



Lig to Case 1 Section I cervix near external orifice showing nests. I residual carcinoma deep in the wall, X too.

the tubes and ovaries. There were no adhesions. The jistoperative course was entirely uneventful and the patient was discharged on the 18th day.

The excised uteru was examined microscopically and islands of residual carcinoma were seen in the endocervix near the external os (Fig. 10)

Five months after operation, the patient was thin and complained of diarrhea and frequency of urination. There was moderate induration at the apex of the vagina with marked redness and vellows high discharge.

This case demonstrates that roentgen therapy can contribute effectively to the destruction of the undifferentiated forms of adenocarcinoma. On the other hand, a large radium exposure (8 ∞∞ mgm hr.) failed to destroy all the tumor in the cervical myometrum.

CASE 2 Undifferentiated carcinoma of corpuuters advanced

This patient aged 6 years white was admitted on lugu to 1011 compilating of irregular vaginal bleeding for 0 month. Lighteen years previou Is he had received radium for a fibroid turn of the uteru. I llowing which her menses ceased. She had had 15 children.

The patient was semewhat obese and her blood pies ute was 100 100. The cervix was molerate in the firm and closed. The uterus was four times normal ite enlarged more to the left and freely movable. No a linexal masses or induration were detected.

It time I curettage the uterine canal mea ured 12 4 centimeters and contained a large amount I yellow frable to us which proved to be undifferentiated a lenocarcinoma on hi tologic xamination (lig. 11).



Fig. 6. Case Buopsy before x-ray therapy. This growth is classified as a moderately modificerentiated denocardnooms originating in the endocervical glands. The tendency t form alveolar structures is learly shown. X61

uterine canal usually shrinks, and its shape changes after the first treatment so that the radium must be rearranged for the second frestment.

This technique had been employed in 28 cases by one of us (M F) in civilian life prior to 1042. The radium exposures in half of

these ranged from 6,000 to 10,230 milligram hours. These cases will be the subject of a future publication.

Several other devices have been designed for the purpose of obtaining diffuse distribution of radium energy throughout the utras. Schmitz, using a 1 shaped applicator as multistered doses up to 6 oco miligram born. Kaplan employing a ring" applicator administered doses ranging from 6,000 to 7,900 milligram bours.

#### CASE PERCETS

CASE 1 Moderately undifferentiated adenous cinoma of the cervix, slightly advanced.

A moderately well nourahed white female and 30 years was admitted to the hospital Spetiment, 1944, compliating of intermensional beforeing ferj months. She had one child aged 17 and had had well as the state of th

On examination the abdomen was that and sigwith no masses or tenderness. The vagina sais so mal. Protruding from the cervis was a hard, consider mass, 5 centimeters in diameter with a red grands surface which bled easily. The uterus was of its usual size, anterior and free. Ovaries were normal There was no induration in the broad lignment

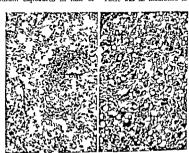


Fig. 7 Leit, Case Biopsy 8 days after -ray treatment started (3 days after completion of tumor dose of 3,050 delivered over period of 5 days). There are algebt to moderant radiation effects, predominately nuclear hyperchromatism and to less extent cytoplasmic sacil-

ing, X70.
Fig 8. Case Another area of section shown in Figure 7 Here the radiation effects are much more striking X70.



Fig 9 Case r Entire uterine cavity showing granulating endocervical surface at site of tumor. The upper portion of the corpus appears relatively normal

Blops) of the endocervical tumor showed moder ately undifferentiated adenocarcinoms (Fig 6) Supervoltage x ray therapy was given with rays activated at 1,000 000 volids over a period of 15 days. The skin dose ranged from 1000 r to 1500 r to each of five skin portals. The tissue dose delivered to the tumor in the occevix was 3,050 r.

Three days later (18th day after initiation of treatment) the cervical tumor had shrunk about 10 per cent, and measured 4 centimeters in diameter. The uterine cavity was curetted and the tissue obstained was beingin proliferative endometrium. The cervical tumor was excised with endotherms. A radium tandem composed of 3 platinum capsules totalling 60 milligrams of radium was introduced into the uterine cavity and three corks each of 15 milligrams radium were placed in the vagina about the cervix. A total dose of 8 000 milligram hours was given

Microscopic examination of the cervical tumor (Kry 7 and 8) revealed in response to 3 oper exten we destruction of tumor cells. Those remaining showed moderate to marked changes predominantly nuclear alterations and to a lesser degree swelling and vacuolation of the cytoplasm.

Sixty five days after radium abdominal pan hysterectomy and bilateral salpingo-cophorectomy were performed the Richardson technique being used. The peritoneum and intestines were normal no enlarged lymph nodes or induration were present. The uterus was small and atrophic (Fig. 9) as were



Fig. to Case. Section of cervix near external onfice showing nests of residual carcinoma deep in the wall \$130.

the tubes and ovaries. There were no adhesions. The postoperative course was entirely uneventful and the patient was discharged on the 18th day

The excised uterus was examined microscopically and islands of residual carcinoma were seen in the endocervix near the external os (Fig. 10)

Five months after operation, the patient was thin and complained of diarribes and frequency of urina tion. There was moderate induration at the apex of the vagina with marked redness and vellowish discharge.

This case demonstrates that roentgen therapy can contribute effectively to the destruction of the undifferentiated forms of adenocarcinoma. On the other hand a large radium exposure (8 000 mgm hr.) failed to destroy all the tumor in the cervical myometrium.

CASE 2 Undifferentiated carcinoma of corpus uten advanced

This patient aged 6 years white was admitted on August to 1044 complaining of irregular vaginal bleeding for a month. Fighteen years previously she had received radium for a fibroid tumor of the uterus following which her menses ceased. She had had 3 children.

The patient was somewhat obese and her blood pressure was 100/100. The cervic was moderate in size firm and closed. The uterus was four times normal size enlarged more to the left and freely movable. No adnexal masses or induration were detected.

At time of curettage the uterine canal mea ured 12 5 centimeters and contained a large amount of yellow frable tis ue which proved to be undiffer entiated adenocarcinoma on histologic examination (Fig. 11).



Fig Case 2. Section of tumor before therapy show up an extremely oddifferentiated carrinous. The cells are compactly arranged in solid sheets—the thin vascular trabeculae coursi g throughout. X63.

The first radium treatment was given on August 18 1041. By means of a three piece bysterostat, 22 capsules of 10 milligrams each were inserted in tri angular arrangement. The dose was 5 760 milligram hours (Fig. 12).

Fifteen days later another curettage was per formed preparatory to the second radium treatment. The uterus had shrunk, the canal now measuring 9 centimeters. A large amou tof yellow frable cheffy necrotic tissue was removed apparently from every portion f the conjust. Histologic examination of this tissue revealed considerable necrosis of the tumor cells, but some islands in the

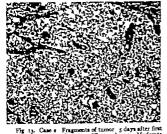


Fig. Case's Pragmont on timory Suys Med. Institution Training and vaccolation of the cytoplasm are noted in area shown. In other fields moderately differentiated papillary pattern was noted showing milder radiation effects. X69.



Fig. 2. Case 2. Roentgenograph of hystroset cataining 1 radium capsules. First radous treatest Uterine canal 12.5 centimeters long, funda 4; custmeters wide, irraduated with angular crosspice.

undifferentiated portion of the tumor shored moderate swelling and vacuolation of the cytopher (Fig. 13) A few areas with a differentiated papeling pattern, not seen in the original biopsy shored ittle effect from radiation.

With the three-piece hysterestat in a different, but still transgular arrangement, 12 appeles of milligrams each were inserted in the steres and dose of 6 yes milligram hours was administed. The total exposure in the two treatments as 11-10 milligram hours.

Forty-four days after the second indian time ment, panhysterectomy and blattend alpide-ophorectomy were performed. The peritocent in intestines appeared normal There were no share lymph nodes along the sorts or beneath the peritory brim. The uterus was smaller than normal streetly moveshed both tubes and various eraphic. In pulling up the uterus, moderate testing used, the uterine veins were toon on either and considerable bleeding ensued. The vein erather small but thin welled and frishle. The purmetrial thances were moderately frishle and survey had a tendency to test through the time. Pepot operative course was uncernful and the patient as

discharged on the 19th day

Histologic examination revealed no endered de residual tumor in the uterus, tubes, or ovares. The

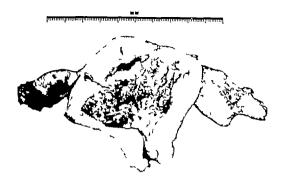


Fig. 14. Case s. Uterus removed 44 days after second radium treatment. Total dose of a treatments 13,450 milligram hours. Note hemorrhagic and necrotic membrane completely covering the uterine cavity

uterine cavity was lined with a thick hemorrhagic and necrotic membrane (Figs. 14 and 15)

Two months after operation the patient com plained of increasing pain radiating down the back and side of the left leg and there later appeared marked edems of the leg. Six months after operation a firm fixed mass was felt in the lateral left lower abdomen above the inguinal region also edema of the left arm the cause of which had not yet manifested itself.

There are several distinctive features to the case. The first radium dose of 5.760 milligram hours which is ordinarly considered adequate for an undifferentiated tumor was ineffective in that moderate radia ton effects were seen in the undifferentiated part of the tumor but only slight effects in the differentiated part. Shrinkage of the uterus brought the pe ipheral portions of the tumor closer to the radium sources during the second radium administration. The reduction in length of the uterine canal from 12 5 centimeters to 6.5 centimeters is noteworthy.

The total radium dose of 12,480 milligram hours is remarkably large and apparently effectively eradicated the uterine tumor

CASE 3 Moderately undifferentiated adenocar cinoma corpus uters, advanced

This patient white aged 54 years was admitted March 10 1944, complaining of continuous vaginal bleeding for 2 months. Menses had been normal and regular until menopause April 1943. She had had 2 children.

The patient was in fair general condition. Bulging from the cervical canal which was idiated to about 4 centimeters was a grayish red granular finable tumor attached to the posterior and right alteral surface of the endocervix and extending well up into the uterus. The corpus was two and one half times normal size in midposition and free



Fig 15 Case 2 Typical section of uterus shown in Figure 14. Note the organizing hemorrhapic membrane resting directly on the compact, atrophic myometrium No residual carcinoma found in this case. X47



Fig. 6 Case 3 Curettage before therapy aboning typical zon of moderat by ndifferentiated admons choosa. While there is a definite abvolar rrangement, in many areas th cetla are grouped in compact masses the frequent abnormal mitoses. X63.

Posteriorly on the right side there was slight thick ening. Biopsy revealed moderately undifferentiated adenocarcinoma (Fig. 16)

The presenting tumor was curetted. The canal was 9 centimeters long. 1 three-piece hysternata: containing to capsules of 15 milligrams of radium each was introduced into the uterite cavity (Fig. 17). A dose of 6.450 milligram hours was given.

The second radium treatment 8 days later consated of the introduction of three cords containing a total of 55 milligrams of radium; the vagina against the cervix. The dose was 300 milligram bours The t tal radium dose was 10 110 milligram hours



Fig. 8. Case 3. Curettage 18 days after 6,450 milligram hours intrauterine radium showing one of several nests of residual, moderately undifferentiated carcinoma. There is slight radiation effect. X63.



Fig 7 Case 3. Hysterostat containing radius opsules of 13 milligrams each. Uterne casel 9 centustra long Dose, 6,450 milligram bours.

Examination at the time of the second mains in treatment aboved the cervit to be of moderite are and deserd. The ut rus was twice normal are at the continued to the continued and the continued and the continued as the continued

Thirty nine days after the vaginal radius treatment, panhysterectomy bilateral salpingo-copie rectomy and appendectomy were performed Catheters had been placed in the ureters. The peritoneum and intestines appeared normal, Osc lymph node a centimeters in diameter was denete adherent to the aorta, 4 centimeters above the lead of the umbilicus, and was not exched. One hope node in the right hypogastric area I centimeter # diameter was excised. The uterus was slabily colarged and irregular The tubes were normal. The right ovary was 5 centimeters in diameter sighth vellowish with a thickened capsule the left ovar) was atrophic. The right uterine vessels aere heated far laterally laying the ureter to the side and taken the broad ligament tissues on the right. On the left, a conservative approach was made going struck down along side the cervir. The patient was dr charged 36 days after operation

Charged 30 days after operation

Histologic examination of the excised tasse revealed small islands of viable-appearing cardinass

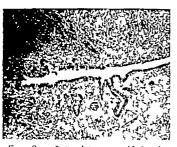


Fig. 10 Case 3. Section of uterus removed 81 days after intrusterine dose of 6,450 milligram hours and vagmal dose of 3,500 milligram hours radium showing one of the readual neoplastic foci indirecting the myometrium. The secolastic cells form tubular structures and show moderate radiation effects. ×63

infiltrating the superficial myometrum in 8 of 10 blocks taken from the corpus (Fig. 10). In the right orary there was a cysuc, metastatic lesson 3 by 3.5 centimeters (Fig. 20). The hypogastric lymph node showed hyperplasia but no carcinome.

A postoperative course of roentgen therapy (1,000 000 volts) was given to the pelvis The kin doce was 4,000 to each of four pelvic portals. This delivered a tissue dose in each broad ligament of 3 to rover a period of 72 days. Subsequently a second course of roentgen therapy was delivered through four portals crossfiring the pracortic node like kin dose was 4.23 000 the tumor dose 5,400 r. There was no evidence that this node contained metastatic carcinoma. Eleven months after operation the patient felt well and was quite active to the patient felt well and was quite active.

The intrauterine radium dose was 6 540 milligram hours followed by a vaginal radium dose of 3 960 milligram hours. Nevertheless 81 days after the intrauterine radium treat ment, the superficial layers of the myometrium were infiltrated by residual carcinoma which was differentiated in the form of tubular structures.

Case 4. Moderately undifferentiated adenocar curoma corpus uten, early

This patient, aged 50 years white was admitted on July 23 1944, complaining of moderate vaginal bleeding on one day July 16 1944. Menopause had over the second of the second years of age.

The patient was of moderate build The vagina was thin with some varicosities The cervix was small and reddened about the closed os The uterus was small, in midposition and free there was



Fig. 20. Case 3. Metastatic popillary cystic lesion in right ovary lined as th large polygonal and columnar cells showing bearire nuclear changes. The pleomorphism and the nuclear alterations re-probably the effects of radia tom ×45.

no adnexal mass or induration. The uterine canal measured 6.5 centimeters at the time of curettage Many small pieces of gravish white tissue were removed.

Microscopic examination showed moderately undifferentiated adenocarcinoma (Fig. 21) generally forming large glandular structures but with occasional scattered compact groups of neoplastic cells and a moderate number of mitotic figures

One week later radium was introduced into the uterine cavity with a 3 piece hysterostat that con tained 6 capsules of 1 smillgrams cach. A total dose of 6 6 300 milligram hours was given. This represented a dose of 1 005 milligram hours per capsule

Forty five days after the radium treatment, pan hysterectomy and bilateral salpingo-cophorectomy were performed. The peritoneal surfaces and in testines appeared normal. No enlarged I, mph nodes were felt along the aorta or under the brim of the pelvis. The uterus was small the tubes and ovaries atrophic. The tusues of the broad ligaments cardinal ligaments and vagina were friable and easily torn. The postporerative course was complicated by partral intestinal obstruction and an abacess in the abdominal incision. The patient was ducharged 35 days after operation.

The aterine wall averaged from 15 to 2 cents meters in thickness and the cavity was lined through out with a creamy yellowish green necrotic mem brane, 7 to 2 millimeters thick. In 4 of 7 blocks residual carcinoma in the superficial myometrium formed large glandular structures with an occasional island of undifferentiated cells showing moderate swelling of the cytoplasm (Fig. 22). In other areas, deep in the myometrium were seen numerous small spaces some partially lined with neoplastic cells of bisarre form.



Fig 2 Case 4 Blopsy before radium slowing moder tely undifferentiated adenocarcinoma. In other fields more solid medallary arrangement of the cells was seen similar to that noted along one edge of the photomicrograph ×63.

Five months after operation the patient felt well and was fairly active. There were no masses or tenderness in the abdomen, and the incision was well healed. The vagina was slightly thickened at the apex. The broad ligaments were soft

CASE 5 Undifferentiated adenocarcinoma of

This patient, aged 50 years, white was selected on August 31, 1032 complaining of brownich right discharge defly for a year She continued to no structe regularity every 28 to 30 days. The flow was moderate, without pain, and lasted; days. See hal 2 children the youngest 23 years old

Examination showed a well nourshed paired. The vaguas was normal. The cerrur was of modern size with two munute polyps on the posteror by The uterus was twice normal size, irrepair he et line anternor and free. The right oway continues amail cyst 4 centimeters in diameter the left surp was atrophic. There was no induration in the petric was atrophic.

Under anestheria, the polyps were exceed Inuterine canal measured 9 centimeters. The cirily was gently curretted. A large amount of frails graular graythy yellow (tissee was obtained, apparent from every part of the corpus. Microscopic raints ton showed the cervical polyps to be being itendometrial tissue was for the most part unide entiated adenocarcinoms (Fig. 3) while is a ferfragments, the neoplastic cells were differentiary into glandplus structures (Fig. 24)

Intracavity radium was administered that piece bysterosist, containing to capacie of in milligrams seed. Fig. 3). The uterase cavity sularge the canal being 9 centimeters lang, and the fundus 3 5 centimeters wide. For extracons arous a done of 7 000 milligram hours was precinated of the dose of 1,000 milligram hours was precinated of the dose of 1,000 milligram hours was precinated of the dose of 1,000 milligram hours was precinated of the dose of 1,000 milligram hours was precinated.

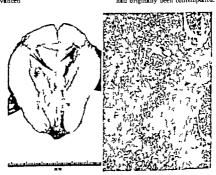


Fig. 20. a, left, Case 4. Uterus reasoned 45 days after 6,000 milligram bour radium. The diffuse pseudoliphiteritic fining membrane deasonstrate the banoqueneity of the radiation, and the probable extensive involvement of the entire tertac cavily by the original tumor b. Residual morpositic famile in superficial asymmetrium of corpus. Not the compact andiderentiated masses of neophstic club. No.



Fig. 23. Case 5 Curettage before therapy showing complete undifferentiation present in parts of the tumor X63

Thirty-eight days after the radium treatment pathysterectomy and bilateral salpingo-ophorectomy were performed. The peritoneum and in testines were normal. No enlarged acritic of hypogastric lymph nodes were palpable. The uterus was slightly enlarged and free. The tubes and ovaries were attophic. The cardial ligaments and vaginal tissues were alightly edematous and felt fragile but no technical difficulty was encountered. The post operative course was uneventful, and the patient was discharged after as desp

The cavity of the uterus was somewhat expanded with the canal measuring 7 5 centimeters (Fig a6) Extending upward from the internal os was a pseudodiphthentic membrane 3 by 4 centimeters in diameter and 3 to 4 millimeters thick. The upper posterior wall of the corpus was covered with a hemorrhagic membrane Sections taken through the lower portions of the corpus revealed extensive car cinoma deep in the myometrum the surface being covered with the thick pseudodiphtheritic mem brane. Similar carcinoma infiltrating the myometrium was found in sections from each cornu, occurring for the most part as infiltrating sheets of cells, with little tendency to form alveolar structures. The effects of irradiation were mild to moderate, and included slight swelling of the cytoplasma and the presence of a moderate number of bixarre nuclear forms (Fig 27)

Seventeen months after operation, the patient felt better than she had in years, and had gained 15 pounds. The abdomen was soft The vagina was thin and pale, somewhat shortened, well healed and with no residual thickening. The broad and utero-acral ligaments showed no induration.

This is a case of predominantly undiffer entiated carcinoma similar to that in Case 2 in which a radium exposure of 7 000 milligram



a definite tendency of the cells to form glandular structures. Compare with Figure 23 ×63

hours failed to destroy the carcinoma completely

Case 6 Moderately differentiated carcinoma of corpus uteri moderately advanced

This patient aged 35 years white was admitted on December 31 1944 complaining of vaginal bleeding which had continued for 18 months. Men arche occurred at 14 with intermittent menses until she was 16 when they ceased completely. In August, 7043 when the patient was 33 vaginal spotting began. After February 1944 bleeding became almost constant. She had had dyspnea on exertion since youth



Fig 25 Case 5 Hysterostat containing 10 radium capsules of 15 milligrams each Utenne canal measured 9 centimeters long fundus measured 35 centimeters wide. Crosspice contained two capsules.

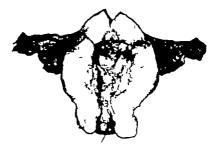


Fig. 26. Case 5. Uterus removed 38 days after 7,000 selfigram hours of radium. Note the thick necrotic membrane covering the endometrial surface except ! a triangular area on the posterior wall not covered by the hysterostat.

The patient was slender Mitral stenosis with cardiac Insufficiency was evident. The cervix was rather small, the os slightly dilated with a minute polyp high in the canal. The uterus was anterior slightly enlarged symmetrical, and freely movable Both ovaries were normal in size and were free

At time of curettage the uterine canal measured 8 centimeters. A large amount of friable, yellowish tlasue was obtained apparently from every portion of the interior of the uterus. Intracavity radium was administered with a 3 piece hysterostat con

Fig. 7 Case 5. One of the several foci of residual carcinoma in the uterus also in Figure 8.6. Extensive deepinfiltration was found, generally by sheets of cells show ing Bittle tendency t. form alveola structures. N the slight swelling of the cytoplasm and many bizarre nuclear forms. X45

taining 7 capsules of 10 milligrams of radom eck. A total dose of 7,000 milligram hours was give Microscopic examination of the endorstram it was a milligram to the endorstram in the capture of the endorstram in the capture of the endorstram in t

Fifty five days after treatment, pathwisteretary and billateral salpiopo-cophorectomy are promed. The pertioneum and intestines appeared formed. There were no enlarged sorts or bregastre lymph nodes. The uterus as small 1 moderately atrophic both tubes and orares we atrophe. There was no technical difficulty in operation. The excessed uterus (Fig. 20) was small and firm with a narrow tubular canal, appearing the entire term of the continued of the cavity were lord with ferred granulations. There was no peudodylatethe membrane. Microscopic examination showed by 1 of 6 blocks neoplastic glands inflittuating the nemertum. The effect of irradiation on the lining the alweed was insignational (Fig. 20).

The postoperative course as completed by prolonged diarrhea and painful frequent gates toon. After a months, the tissues at the aper of the vagina separated and formed an aker 3 continues in diarreter. There was industion around the ulcer particularly beneath the bladder.

The uterine cavity was not large the radium distribution and dose (7,000 millerin hours) was adequate according to our oral concept of dosage but there was readial carcinoma infiltrating the myometrium.

CASE 7 Moderately differentiated adesocardnoma of corpus uteri, advanced.



Fig 28. Case 6 Fragments removed at time of diagnostic curettage composed of moderately differentiated neopartic glands infiltrating the myometrium ×63.

This patient aged 67 years white was admitted on August 15 1044 complaining of pink mucoid discharge for 18 months. The patient had four children, the youngest 22 years old. The menopause had occurred 20 years ago. One year ago. 6 x ray treatments given elsewhere stopped the pinkish discharge for 4 months.

The patient was obese and had hypertension (200/110) and arterioscierosis. There were no abdominal masses or tenderness. The mucous membrane of the atrophic vagina was red the cervix was small, firm and red The uterus was in midposition and two one half times normal size. No adnexal mass or lodgration was felt.

At time of curettage the uterine canal measured 8 centimeters. Microscopic examination of the tissue obtained revealed moderately differentiated in filtrating adenocarcinoma (Fig. 31)

One week later a 3 piece hysterostat was inserted containing of capsules of ro milligrams radium each. The dose given at this first radium treatment was 4500 milligram bours. Eight days later the patient deeped pelvic celluluts, and at this time there was moderate induration in the rectovaginal epitum and marked induration in the left broad ligament. The temperature and discomfort gradually subsided and the patient was discharged. Per sistent pelvic induration caused the second radium treatment to be deferred.

Seventy days after the first radium treatment the patient returned with no complaints and no bleed mg. Penkeillin was given prophylactically for 5 days. Under anesthesia the uterus was one and one-half times normal size and fairly movable. There were no palpable adnexal masses but there was some thickening in the left uterosacral ligament. The uterus was thoroughly curetted. The endome trium was scant and the interior of the uterus was quite rough to the curette. At this time the uterine



Fig 20. Case 6 Uterus and adness 55 days after 7 000 milligram hours of radium. Note the small uterine cavity covered with a granulating membrane

canal measured 65 centimeters. A 3 piece hystero stat containing 8 capsules of 10 milligrams radium each was inserted and a dose of 4,400 milligram hours given (Fig. 32). The postoperative course was uneventful.



Fig 30. Case 6 Low power showing one of the several residual areas of carcinoma infiltrating the myometrium.



Fig. 3. Case 7. Blopsy before therapy showing moder tely differentiated adenocarcinoma infiltrating the myometrium. ×63.

Curettage 75 days after the first treatment of 4 500 milligram hours dislodged only a few fragments of tissue however they consisted mostly of per sistent adenocarcinoma infiltrating the myometrium and showing no demonstrable effects of ir radiation.

Eight months after the first radium treatment the patient felt weell except for occasional bearing down sensations in the lower abdomen. The uterus was smaller than normal pelvic induration had didninabed Panhvaterectomy and bilateral sal pingo-oophorectomy were performed. The operative



Fig. 33. Case 7. Uterus 6 mo the after second radium treatment. Uterine canal now measures 4.5 centimeters long (original length 8 centimeters). Not the uterine carity completely lined with shaggy necrotic membrane.



Fig. 32. Case 7 Second radium treatment. Derect canal has shrunden to 6 5 centimeters in length and L-7 to 7 centimeters in width. Hysterostat see occurs capsules of o milligrams each. Dose 4,160 milligram kest. Total dose, 2 treatments, 8,000 milligram least.

procedure was complicated by numeror proinflammators adhesions. There was marked threesalpingstis, with moderate industrion of the wosacral and left cardinal ligaments fixing the story deep in the prelivis.

The uterus was small with a canal 45 cet meters long. The cavity was completely lined 194



Fig. 34. Case 7. Section of terms shown in Figure 11 ith residual careinoma deep in the myonetrum.

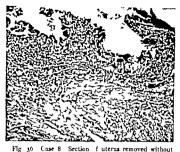


Fig. 3. Case 8. Fragments from diagnostic curettage made up entitlely of solid maness of large polygonal neoplastic cells similar to the arrangement seen in Cases 2 and 5. In other areas the cells are differentiating into large sandolar structures. Mitoses are numerous throughout ith many almormal forms. This is classified as a moder stely undifferentiated adenocarienoms. X60

shagy membrane beneath which patchy areas of organization were seen. The invometrium was not significantly thinned and the vessels were prominent (Fig. 33). Microscopic examination of 14 serial, cross-section planes through the entire uterus revealed tumor in a sections of the midcorpus. The tumor was present as elongated glandular structures deep in the myometrium in one (Fig. 34), while in the other the neoplastic cells were arranged in a solid nest.

The patient received a total dose of 8 gco milligram hours intrauterine radium in 2 treatments which brought about shrinkage of the uterus and disappearance of the symptoms. The outlook for arrest without hysterectomy seemed hopeful However the finding of residual tumor in the other cases had demonstrated the necessity of hysterectomy wherever possible. Therefore operation was performed in spite of hypertension obesity diabetes advanced age and residuals of pelvic inflammation.

Residual carcinoma was present 75 days after the first radium treatment of 4 500 milligram hours, a dose which is considered adequate by many operators. Five and one half months after the second radium treatment of 4,400 milligram hours several small slands of residual cancer could still be found deep in the myometrium. They might have remained dormant during the rest of the pa



usual preoperative course of radium showing residual zone of carcinoma in only one of the multiple sections taken ×63

tient s life span but their removal increased the possibilities of a cure

CASE 8 Moderately undifferentiated adenocar cinoma early almost completely removed at original biopsy curettage surgical treatment only

This patient aged 30 years white was admitted to the hospital December 4 1944. Menses had customarily lasted 4 days with moderate flow. However she had a prolonged menstrual period lasting 8 days in August and again in November and December 1944. There was no intermenstrual bleed.

The vagina appeared normal the cervix was smooth firm and closed. The corpus was small and free the ovaries normal.

The uterus was curetted thoroughly and a moderate amount of soft grayish tissue was obtained Microscopic examination revealed moder ately undifferentiated adenocarcinoma (Fig. 35). Panhysterectomy and bilateral salpingo-oophore tomy were performed. There was no evidence of extension or metastasis. The uterus tubes and ovaries appeared normal.

The interior of the uterus seemed normal when inspected grossly but on microscopic examination one minute neoplastic focus was found others apparently having been curetted away (Fig 36)

The postoperative course was uneventful 3 months later the patient was well and showed no evidence of disease

This is an early case of moderately un differentiated adenocarcanoma of the uterus treated only by extripation of the uterus tubes and ovaries. The curettage for biopsy almost completely removed the tumor

TABLE I -SUMMARY OF CASES

Cue No.	_ ^	Dareti ge symptems	on Type somocurcinoma		interval radium to punhysterectomy	Pathology after contration	I dies as
	и	1 00	Moderately un- differentiated (radiostryss)	X-ray temor dent 3030   \$000 cages for in pleres and vagina	66 days	Islands curchang	I no Ke recognis
	67	130	Und Secutiated	1,480 mgm kr	44 44.573	No carement	10 me Literal )
1	54	10x0	Moderately so- differentiated	0,4 mgm is (64,90 mgm in to allerme clearly 1,060 mgm is to regions)	30 days	Islands carcinoms aterus and right owny	14 No No recognize
	ю	k	Moderately un- differentiated	bayo mgm kr	45 4279	Intends carcinona	N to
•	JP0	E++	Undifferentiated	New miles pa	på den	Liens Cardinose	H Res
۰	5	i mo	Moderately deStructured	Jood selber jrt.	21 quin	Islands curement	J No No ricestrar
,	67	1 ma	Moderately deformationed	\$000 mgm hr	6 mostles	lakada tardama saryas	6 Page 1990 T
•	30	100	Moderately un- deferentiated	Kosa		Superficial is-	й пр. Же жеружий
٩	<b>13</b>	Several yra	Moderately differentested	Noos		Advanced curdness others with meta- tance both grance	Dari 6 per periodos
re	45	6 <b>20</b>	Moderately discreptured	Nome		Admotarcacone si- trus with oversian	Ke Australia

CASE 9. Moderately differentiated adenocar cinoma corpus uteri, advanced with metastasis to ovaries

This patient, aged 58 years, white was admitted on August 11 1942 with a history of daily bloody spotting from the vagina for many years. Menses ceased at 40 years.

The patient weighed soo pounds. Abdominal palpation revealed large masses rising from the pelvis to the level of the umbilitions. The curva was high in the vagna, smooth and closed. The fundus could not be distinguished from the lower abdominal masses. There was no induration or fixation of the pelvic floor.

At operation the uterus was two and one half times normal size soft and nodular. Both ovaries formed large cystic lobulated tumon, 35 centl meters and o centimeters in diameter. The ovarian tumon fallopan tubes and supracervical portion of the uterus were excised with difficulty.

Microscopic examination revealed extensive infiltrating moderately differentiated adenocarcinoma of the uterus with bilateral ovarian metastases

Sixteen days later radium was inserted into the cervix and vagina for a total dose of 3 600 millipram hours. An incomplete course of postoperative roentgen therapy was given elsewhere. Six months later the patient died with peritional carcinoma tosis sactice and a large metastatic retroperatoreal tumor

This patient is recorded as an instance of ovarian metastasis, the significance of which will be discussed later CARE 10. Adenocarcinoma corpus uteri, il

This patient, aged as years, white had constrained being from July 1944 until Jacany 1949, 1949 the patient of the patient of the patient of the term of the term of the term of the term of admiration to this bospital in Jaren as, 1948 pelvic masses were patientle. Became of the term of the patient of the term of the patient of the pat

This case demonstrates the necessity for cophorectomy as part of the routine triat ment of adenocarcinoma of the uters. The use of radium alone is attended by the darger of neglect of oversan metastasis.

#### ANALYSIS OF CASES

In this series of 10 cases of adenocarcinom of the uterus, 9 were moderately advanced of advanced but without induration of the pirk ligaments, and were therefore considered operable. Carcinoma protruded from the cervical os in two uters and ovarian metastas as subsequently found in 3 patients. Microscopic examination revealed moderate differentiation (grade 2) in 4 cases, moderate in-

differentiation (grade 3) in 4 cases, and complete undifferentiation in 2 cases. This distribution is atypical in that most large sense have shown the majority of cases to be differentiated adenocarcinoma.

In 7 of the 10 cases treatment with radium was followed by panhysterectomy and bi lateral salpingo-oophorectomy. The radium dose ranged from 6 030 to 12,480 milligram hours. Case 1 (the only instance of adenocarcinoma of the endocervix) had an x ray tumor dose of 3 030 r followed by 8 000 milligram hours of radium.

The size of the uterus was moderately or greatly reduced following radium. In Case 7 for example the uterine canal shrank in length from 8 to 4.5 centimeters in Case 2 the uterine canal shrank from 12.5 centimeters to 5 centimeters to 5 centimeters.

The operative procedure was not unduly difficult except in Case 7 in which the residuals of pelvic inflammation complicated the operation. In every instance the parametrial tissues were somewhat sclerotic, with lack of resiliency and the sutures had to be tied with care. The uterine vessels seemed smaller than usual. In one instance the uterine veins were torn on each side as the uterius was being elevated. The Richardson conservative panhysterictomy technique was used in all except Case 3 in which a radical dissection was performed on the right side only because of slight preradiation thickening in the right uterosacral ligament.

Interesting was the finding of nests of apparently viable cancer cells in the superficial myometrium in 6 of the 7 excised uteri, with deeper extension in 3. The one uterus (Case 2) in which no residual carcinoma was found had a highly malignant undifferentiated adenocarcinoma which received 12,480 milligram hours of radium given in 2 exposures.

The location of residual carcinoma deep in the myometrium explains why probatory curettage performed several months after radium treatment in order to evaluate its effectiveness, may fail to extract the residual carcinoma.

It is possible that, after irradiation some of this residual carcinoma might not have manilested itself clinically for 5 years or longer However hysterectomy is necessary to complete eradication of the local tumor

Reasons why the combined radium surgical treatment gives the best results according to the literature include (1) reduction of intra uterine infection preoperatively (2) reduction in aize of the uterus simplifying the operative procedure (3) immobilization of cancer cells in the uterus reducing metastasis (4) sclerosing of lymphatics and blood vessels reducing metastasis (5) prevention of recurrence from operative spill in the vagina and abdominal incision and (6) favorable results borne out of statistical evidence

Statistical evidence however is the only concrete information on the value of preoperative radiation. The available statistics discussed previously are based on small series varying from 10 to 37 cases. The 5 year arrests range from Sheffey s 38.4 per cent in 30 cases to Arneson s 90 per cent in 10 cases. Series of as many as 100 cases with uniform radium treatment in doses of 4000 milligram hours or more should be available before the rôle of preoperative irradiation can be evaluated.

Preoperative roentgen therapy has been recommended by some notably Miller who emphasizes the additional destruction of tumor cells in the parametrium by this method. However the intensive x ray therapy necessary to give a lethal tumor dose may cause destructive changes in the bowel, and adhesions The immediate postradium com plications following the use of large doses were not serious. The one instance of acute pelvic cellulitis (Case 7) followed a relatively small radium dose of 4 500 milligram hours. How ever the later deletenous effects of intra uterine radium in the large doses employed in this series are not to be overlooked. Post operative hospitalization is lengthened Recovery of vitality is often delayed for months. There may be delayed healing of the vaginal wound intermittent diarrhea, and frequency of urination If the eventual cure rate is in creased these disadvantages can be disre-

One patient (Case 8) had undifferentiated adenocarcinoma for which many authors recommend preoperative radium. The short

history scant endometrium and small uterus indicated an early lesion. Hysterectomy was performed without preliminary radium. Three natients (Cases 2 o and 10) had metastasis in the ovary This not uncommon incidence of ovarian metastasis is frequently overlooked in planning therapeutic procedures for adenocar cinoma of the uterus. It constitutes an important argument against the use of radium alone in the treatment of this disease. Preoperative radium cannot materially affect the metastatic lexion in the ovary. Consequent postradium hysterectomy should not be unduly delayed.

#### SUMMARY

Ten patients with adenocarcinoma of the uterus were treated in the past 3 years at Walter Reed General Hospital, Seven patients received unusually large doses of таблит (6 010 7 000 7 000 8 000 8 000 10.410 12.480 milligram hours) followed by hysterectomy 28 days to 6 months later. Six of these 7 uten showed residual carcinoma. The one case in which there was no remaining carcinoma after radium was an extensive undifferentiated tumor in a large uterus treated with 12.480 milligram hours radium One nationt with very early undifferentiated adenocarcinoma was treated with surgery alone Three patients had ovarian metastasis.

#### CONCT TWO IN

- This study suggests that radium alone will not completely eradicate adenorationers of the uterus. Subsequent excision of uters tubes, and ovaries is necessary
- 2 The exact role and specific indicators for preoperative radium therapy have not ver been satisfactorily delineated

#### REFERENCES

- ARMERON A. N. Am. J. Roentg., 936, 3646

  2 ARMERON A. N. and HAUPTHAM. H. J. Am. M. Au. 04I 6'30
- 941 6'40.

  BRINDLEY G V Ann. Surg., 941, 1470

  CORRECADOR, J A. J.Am.M.Ass., 944, 176 H

  DIETEL, F G. Strahlentherapie, 1914, 4540

  FRIEDRAM MILTON Raffology 1940, 1578,

  HEALY W P and BROWN R. L. Am. J Obst. 1978,
- 8. HEYMAN I Acta radiol. Stockh., 017 8 03
- o. Ibid., oar sa
- 9. Ilbd., 941 32

  RAFLAN IRAI. Radiology, 948, 59 35

  MARROY JAMES C and CREEG ROBERT O Seq.
  Gyn. Offit, 919, 70703;
  12. MILLER, N. F. Am. J. Offit, 919, 40 79

  3. MONTON, D. G. Am. J. Roenty, 914, 4769

  4. PATTRICON RAISON and PARKEN, HERRITI M. 3.

- Brit J Radiol, 914 7 597

  SAMPSON J A. Am J Obst., 914 1878

  SOMETH, HERMERT E. SETEME, 1974 5 197

  SILETET L. C., THULTUM, W J and FARILL, D. M
- Am. J Obst., 913, 40 786. 18. STRAUM, HYMAN N Nork State J M 1939.
- a. WARD, G. G. Am. J. Obst. 1042, 44.393-

# PRACTICAL OBSERVATIONS ON THE COPPER SULFATE METHOD FOR DETERMINING THE SPECIFIC GRAVITIES OF WHOLE BLOOD AND SERUM

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THE clinical significance of the meas urement of the specific gravities of whole blood and plasma or serum has been discussed by Barbour and Ham ilton Weech et al Scudder Kagan Ashworth and Adams (1) Gray and Elhot Phillips et al Technical complications have at times offered impediments to the routine clinical applica tion of several methods particularly in a military sense The authors of the copper sul fate technique (Phillips Van Slyke Dale Emerson Hamilton and Archibald) point out that this is a technically simple quickly con ducted procedure which maintains a sufficient degree of accuracy under the usual variable circumstances to give it much clinical applic ability In the present communication it is proposed to present additional evidence in support of the practical use of the copper sulfate values of whole blood and serum spe dic gravities

#### METHODS

The copper sulfate solutions were prepared as outlined by Phillips and co-workers. The stock solutions (specific gravity 11) were checked periodically by pycnometric procedures. At times when solutions were prepared aboard ship pycnometry was not possible and the fresh standard solutions were checked via a series of normal samples with previously pycnometrically checked solutions. It was possible at other times to compare our solutions with those prepared by Army labor atory facilities ashore. The constancy of checks established much confidence in the technique.

This ork was commenced at the suggestion of and progressed soder the direction of the senior uthor, Fleet Medical Officer Staff Commander Allied N val Forces, Southwest Pacific Area.

Altogether 16 different batches of the stock solution were used in preparing the various standard sets used in the observations

For the actual determination the following procedure was used throughout venous blood was collected in a dry syringe (5 to 20 c c capacity) while stasis was limited as much as possible and drops from the syringe tip be fore clotting occurred were used for measuring the blood specific gravity, the remainder of the blood was allowed to clot in a test tube spun in a centrifuge and the specific gravity of the serum was determined with the aid of a medicine dropper

The Sahli hemoglobin measurements were conducted first with day light then with artificial light as background for color matching 145 grams per cent were considered as 100 per cent normal. The red blood cell counts were done with routine type of equipment 10 squares being counted on each occasion.

#### NORMAL VALUES

The normal series were taken from inactive normal healthy. Army and Navy personnel (males) most of whom had been established in staging areas at sea level in tropical local ities for weeks to months. The samples were taken throughout the day prior to which time the individuals had been ambulatory for varying intervals.

The frequency distribution of the whole blood specific gravity values on 577 different individuals is given in Table I The following features of these data are emphasized. The over all range is 1 o52 to 1 c64 with only one value falling in each of these extremes the arithmetic mean value 1 o58: the standard deviation ( $\sigma$ ) is occip the mean  $\pm 2\sigma$  equals 1 o543 to 1 o619.

The frequency distribution for the serum values on 574 of the above 577 samples is also given in Table I The range for these values is 1024 to 1030 with only one value occurring below 1025 the mean is 10273 the equals 0013 the mean ±20 equals 10247 to

These normal values have been taken as the basis for evaluating values obtained from subjects under various abnormal states in tropical zones (New Guinea to the Philippine Islands). It has been considered safe to state that blood specific gravity values by this technique outside of the range of 10543 to 10519 (mean ±20) are significant in denoting red blood cell dilution or concentration beyond normal limits. By the same token serum specific gravity readings outside of the range 1024 to 10290 have been considered significant in denoting dilution or concentration of the serum proteins beyond normal limits.

FPECIFIC GRAVITY VALUES RED CELL COUNT INEMOGLOBIN CONCENTRATION (SAILL) COMPARISON ON NORMALS

It will be noted in Table II that the Sahli hemoglobin concentration as read against ar tificial light averaged about 0.8 per cent higher figures than the comparisons read against daylight.

All three of these values (specific gravity of blood hemoglobin concentration red blood cell count) depend mainly on the concentration of red cells per unit of blood for their level and so long as the methods of determin ation are reasonably correct one expects a satisfactory correlation between the values. The correlation obtained by the routine measures as demonstrated in Table II seems satisfactor ily close and resembles similar correlations presented by Ashworth and Adams (1) and by Grav and Elliot utilizing other specific gravity and hemoglobin methods.

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TABLE I —FREQUENCY DISTRIBUTION OF WE ). I
BLOOD AND SERUM SPECIFIC GRAVITUS

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820.1	122	1.027	125
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-061	15	.0255	,
.a63	15	1.029	
وكعم	3	1030	17
1.004		1.03	
.o65	0		
Total	577	Total	-

The whole blood values are eatherly symmetrical The lover bysom of the "haif" values! I be seen screen consulered due to the in two which enumerages whole values I or ensurance the subsection that whole values are subsectively have the whole values when the drop of seens act as known was gravely between the haift and the bade values who

VARIATIONS IN SPECIFIC GRAVITY VALUES IN MORMAL SUBJECTS INDUCED BY VALUES SOLUTIONS ADMINISTERED INTRACEMENTAL

The variations in the specific gravities of subjects over a 24 hour period effected by setsantial volumes of physiologic saline solution, normal human plasma, concentrated human plasma (four fold concentration) and coordinated human albumin (25 grams per cert) given intravenously sere observed. The results are presented in Figure 1 which also contains similar observations following a comparable volume of whole blood given 2 subject

with slight hemodilution Considering that the specific gravity of whole blood is due mainly to the concentra tion of red cells and that the serum species gravity is due mainly to the concentration of the proteins, certain observations are ende Saline, normal plasma, concentrated place and concentrated albumin all gave ree to dil tion of the recipients red cells. Following the latter three solutions this dilution remares evident until 12 to 24 hours had passed whe preinfusion levels were reached. For 12 .22 the dilution was evanescent and a premiuse level was noted 90 minutes after the infu-The protein-containing solutions (normal platma concentrated plasma, concentrated a

TABLE II—COMPARISON OF SPECIFIC GRAVITY VALUES, HEMOGLOBIN CONCENTRATION BASED ON THESE VALUES AND TAKEN FROM THE PHILLIPS AND ASSOCIATES CHART THE HEMOGLOBIN CONCENTRATION BY SAHLI'S TECHNIQUE DAYLIGHT AND ARTIFICIAL LIGHT READINGS AND THE RED BLOOD CELL COUNT

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-	056	0263	4.0	6.0	11	16 5	118	4-04	26	.030	oso.	53	6.5	4.3	7	18.6	4 86
	1.0545	1.0165	13-4	5-9	00.5	6.z		441	7	1.055	1.0 1	148	6		16.5	14.8	4.8
-1	0565	rosti	14 8	5.5	o6.8	16	10	4-03	13	1.055	026	143	14.5	100	5.0	03-4	4 83
. 0	ा	1.0361	118	145	100	15 5	106.8	4.365	20	1.052	1.037	1	7.0	117.3	75	20 6	5-37
19	1.057	Att	13.2	5	03.4	8.0		4-7	30	1.055	1.016	11.0	120	3.4	13	8.3or	4-7
п	OHIS	Lon	14-4	13	104.8	15-5	06.8	4-74	1	t 0575	ord	11	16 5	1.8	7	7.3	4.05
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Ħ	<b>•57</b>	1.017	14.7	مو	10-4	10	09.6	5.15	11	.0575	4دم	1-	5-5	oó 8	6	11	4.85
14	o22	1000	13 9	5	3.4	3.3	105 5	4 355	34	.055	2.026	3-0	مو	0)-4	75-5	o6.3	4-00
- 5	9415	1.015	39	5 8	1080	16.0	111 7	4 305	35	0501	1.037	14.3	5	1 14	5-5	8	\$14
r6	062	018	r6.8	6.5	11.5	7.5	20.6	g_16	16	050	027	16	5	1 3-4	5.5	106 8	1-14
17	LAST	017	1L1	5-5	06.8	6		4.71	37	1.0565	.026	14.6	5.6	107 \$	6		4-7
-11	1 050	1.006	23.8	17.0	17.3	17.5	10.6	5.17	38	1-0111	.ozó	14.	10	34	15-5	06.8	4 33
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Atternations: So, or specific gravity; Rich chart, hemofolds concentration as obtained from the Phillips chart per cost normal heaters as a sprain per control her and cell count expensed in allifors. Per rege.

bumin) produced little change in the serum protein concentration. Conversely saline effected a marked drop in the protein concentration which returned to preinfusion levels only after some 6 hours had elapsed. Blood given to a subject with specific gravity values highly below normal caused an elevation in the red cell concentration the continuation of which must have become augmented by red cell production and liberation from active bone marrow areas. Little change occurred in the serum protein concentration from this in fused volume of blood.

ISOLATED CASES ILLUSTRATING THE CLINICAL APPLICATION OF COPPER SULFATE SPECIFIC GRAVITY VALUES

The isolated cases used in demonstrating the clinical application of the specific gravity values were all battle casualties occurring in various engagements during the recent Philippine campaign. At present the emphasis is placed mainly on the specific gravity studies as they deviate from the normal. A correlation of such studies with other aspects of casualty care, as types and volume of intravenous solutions used, types of cases response to therapy—with main consideration of the shock state—will be presented later in a compilation of over 300 closely observed cases out of some 5000 casualties handled by our medical facility (16)

#### HEMORRHAGE

It has long been emphasized that the loss of whole blood from the circulation is followed by dlutlon of the remaining red cells. Whether there is dilution of the scrum (or plasma) pro-

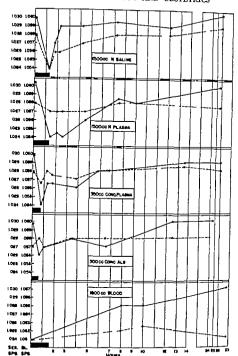


Fig. 1. A demonstration of the changes in the specific gravities of whole blood and serums induced on normal subjects by various commonly said intervence indust. Conparable volumes were used. The normal plasma, concentrated plasma, concentrated albumin solution each contained approximately 75 grams of proteins. The blood was diluted about 1 to 5 with clitera-destrose authoroughust preservative solution. The time interval for the infusion is designated at the lower left corner. The solid finepresent whole blood specific gravities, the broken lines serum specific gravities.

teins over a sustained period seems to depend on several factors as the extent of blood loss, the interval of time before a determination is

made, the state of the protein stores, the demands on the protein stores by other complications, etc. The hemodilution commerces

TABLE III .- SPECIFIC GRAVITY VALUES IN TABLE IV -- SPECIFIC GRAVITY VALUES IN CASE 2 CASE 3

Tiese Hour	Elood Sp. gr.	Sorum.	Hgb.	Ser prot. chart	Therapy	Remarks	Time Hour	Blood Sp gr	Seruan Spar	Hgb.	Ser prot. chart	Therapy	Remarks
	1.035	1.0115	4.5	63		Severe shock		1.045	02	0.5	3 5		
6					1000 C.C. M.	Amputation performed BP rro/80							BPzes/68 Shock
						Out of shock	3					oo c.c. bl.	
	}		,		500 c.pl	gras Ca gracconate	1.5		-		_		118/68
	<b>├</b>	-				with bi.	3	1				600 c.c. bl.	<b>)</b>
7.5	051	0175	11.6	7.0		Pri Satisfactory	4.5					∞ c.c. bl.	<b>—</b>
The	graph.	of calc	hum glu	conste w	ere given la do	en between each	- 5	03	035	,	6.9		<del> </del>

The grass of calcium glucosate were given in these between each the standard expression in the first them to be patient was seen and appreciated, light, thank and see period calcium expression in grass period calcium expression in grass period and the standard expression in grass period to the production of the production of

early but when compensation by the subjects own resources is all that induces it the final degree of dilution of the blood may not occur for 24 to 36 hours (7) During the first hour the dilution may not exceed 10 per cent (13) indeed in occasional patients with hemor rhagic hypotension it has been reported that there may be no dilution or actual concentration of the red cells (hemoconcentration) (6 The administration of intravenous fluid not containing red cells particularly protein fluids as plasma or albumin solutions by their inherent properties accelerates the devel opment of the final degree of hemodilution in hemorrhage cases (17)

The extent of the drop in blood specific gravity the effect on the serum specific grav ity the state of the blood pressure, the clin ical picture, the response to therapy (including the quantity and quality of the fluids used) are all important in estimating a case of acute blood loss clinically Examples demonstrating the value of specific gravity studies will be divided into the patient (1) suspected of hav ing a substantial hemorrhage (2) with hemor rhage with embarrassment to the circulation and (3) with hemorrhage followed by volume compensation (acute hemorrhagic anemia)

Following is an instance of a patient suspected of having a substantial hemorrhage

CASE 1 This patient sustained multiple lacers tions involving the skin and muscles of the upper ex-

tremities back and legs there was no fracture. He was seen about 4 hours after the injury ago cubic centimeters of normal plasma had been given in travenously. The specific gravity values were 1 054 for blood 1 0265 for serum, the blood pressure was 120-80 millimeters hemoglobin, the pulse rate was 100 beats per minute, but the patient was restless confused the pulse was weak. Following 1 000 cubic centimeters of normal plasma by vein there was obvious clinical improvement and 75 hours later the specific gravity figures were 1 050 and 1 026 After 22 to 23 hours the specific gravities levelled off at 1 051 to 1 027 slightly lower than the normal range for the blood value.

The patient sustained injuries conducive to blood loss the extent of which was unknown. The clinical improvement with plasma alone plus a stabilization of the blood specific grav ity at levels only slightly below normal indi cated a blood loss not of extreme proportions. Without the concentration studies complete confidence in this case would have been more difficult.

Hemorrhage with moderate to severe circula tory embarrassment. We are considering here the patient with tendency toward a lowered arterial pressure weak pulse restlessness or disorientation to coma lowered urinary out put, paleness with or without sweating etc. following types of injury conducive to copious hemorrhages Some have termed the state hemorrhagic shock (5) others prefer hemor rhagic hypotension applied to recoverable cases (22) while others object to applying the terms shock where simple hemorrhage appears to be the main complication (14) The demonstration of hemodilution by the copper sulfate method is our main concern at present.

TABLE V —SPECIFIC GRAVITY VALUES IN CASE 4

				_		
Time Hour	Blood Sp. gr	Section.	Hela.	Ser prot. chart	Тесару	Remarks
	415	1.015	L	6.9		
L.S					too er pl.	D-8 pl. for urinary flow
<b>100</b> 5	o+1	015		6		
					90 C.C. N.	
,,,	248	1.015	D0 0	6.2		
11	.40	015	LI	6.5		
11					HOO CE M	
9.5	1.013	036	•	6.5		
\$0				_	190 c.c. N.	
43	111	925	14 1	6		

CASE 2 The first patient sustained severe injuries to the right leg following an attack on one of our ships. He was seen some 8 hours later at which time there were clinical indications of severe circulatory embarramment pulse too weak to be definitely pal pable, semicoma, marked pallor lowered skin tem perature. The right leg was severely crushed and mangled and it was learned that the individual had been in the water (sea) some 45 minutes without a tourniquet before being rescued. Table III demon strates marked hemodilution Following the admin istration of concentrated albumin and whole blood (amount in table) there was much improvement, the right leg was amputated, additional blood and plasma were given and later the specific gravity of blood was only slightly below the normal range. The patient did well subsequently

CARLY The second patient was seen 3 to 4 hours following the injuries, extensive shrapped lacerations of the face, right arm, and right leg. The patient was weak, pale, cold the pulse quite weak, the blood pressure 10x/68 After 1 too cubic centimeters of whole blood there was much improvement but a total of x,800 cubic centimeters of blood was required to elevate both blood and serum specific gravity values to near the normal ranges (Table IV). The patient improved and progressed nikely

Hemorrhage with acuts posthemorrhagic anemia This group includes the patients seen 2 to 3 days or longer following injuries producing blood loss and the final degree of hemodillution has been reached At this time it is considered that an insufficient interval has elapsed in many cases for dictury and bone marrow depressing complications to affect the blood picture appreciably

Case 4. The first illustrative patient (Table V) was seen 2 days following the injury (gunshot wound

TABLE VI.—SPECIFIC GRAVITY VALUES IN CASE 5

			3		
Time Hour	Bleed up gr.	Seriou IP pz.	Heb.	See pent. thant	Throng
	O4e	631		11	
8.15	940			1	
1.0					THE CAN
<u>.</u>					time to K
4	1.447	1.021	IIJ	145	
1					Descript
17					I = CA H
**	1.067	635	3	6	
4	050	ronti	146	4,	

with abdominal perforation, injury to left kidney and apleon, emergency splencetomy). The dilution of the red cells was prominent and it required 3 750 cake centimeters of whole blood given in 48 hours time to clevate the specific gravity to normal levels.

Case of the according to the Well Brivier can day following the bijury by their largement casing laceration of the abdominal wall and perfocus, or foration of the abdominal wall and perfocus, or foration of the minary badder and rectum. On this occasion, there was dilution of both red chius serum proteins (Table VI). The specific parity values returned to normal range following 4400 cubble centimeters of blood.

#### DITTO NO

Early phase Here is included burn assessen while there is increased permeability of capillaries giving rue to a decrease in the plasma volume and hemoconcentration (shock period)

CARE 6 The first patient was seen 8 hour following the hum (Table VII). He had recrived plans intravenously prior to this time but the amount was not known. When seen there was proconnect centration of the red cells as demonstrated by a blood specific gravity value well showe the normal range. The extent of capillary damage and plans volume depletion can be appreciated by the volume depletion can be appreciated by the volume of protein solution required to lower the blood specific gravity to normal levels.

Care 7 fine second case is presented mainly because it reveals the highest blood specific parity values seen. This patient came under our observation 4 hours after severe burns involving the entire body surface with the exception of about so per set of the left arm and the area covered by symmotor trunks. The left fey was parched, the foot has at cold. The patient was in deep abock, accommode the pulse not palpable, the aith about the grain cold and prominent with bluish-gray moting the first blood samples (from femoral velin) were a ceedingly thick and almost black in color (species).

TABLE VIL-SPECIFIC GRAVITY VALUES IN TABLE VIL-SPECIFIC GRAVITY VALUES IN CASE 6

The Hear	Flood Sp. gr	Seram Sp. gr	Heb. chart	Ser prot chart	Thurspy
	1.003	.o £\$	\$0.1	61	1
•	028	1.031	10	6	400 alb. 150 pl.
10	3 959	.0155	150	63	750 C.pl. 750 C.pl. 700 D-H
34					sco ec calb
15	1 057	2770.	141	7.0	

gravity 1,074) The tremendous quantities of albu min and plasma required to control the hemoconcen tration are given in Table VIII The blood specific gravity returned to normal levels, the left foot be came warm and pink, the patient regained con sciousness. At no time was there evidence of pulmon ary edems or right sided cardiac embarrassment (no venous engorgement) The first urine specimen con tained four plus albumin red cells and casts As soon as consciousness began to appear troublesome retching with vomiting of blood began. The patient was reported to have died later aboard the evacuating ship (With the patient so severely burned and without treatment for so long and in such extreme shock, it was decided to cope with the hemoconcen tration regardless of the volumes needed so long as venous congestion or pulmonery edema did not be come evident, as this approach seemed to give him his best chance)

Later phase This group includes burn cases seen after 72 hours when anemia and hypoproteinemia begin to be prominent.

Case 8 This patient had sustained burns involv ing about 40 per cent of the body surface of second and third degree types 5 days before. Plasma had been administered the amount was not known. On admission the blood-serum specific gravities were 1 047 to 1 019 Following 300 cubic centimeters of concentrated albumin solution (75 grams albumin) 500 cubic centimeters of normal plasma and 1 100 cubic centimeters of citrated blood during the first day the specific gravity values became 1045 to 1.0215. An additional 1 100 cubic centimeters of citrated blood were given and progress was being made in correcting the anemia hypoprotememia complications when the nationt was transferred for evacuation.

#### ANEMIA

An opportunity for the observation of specutic gravity values in the anemia of malnutra tion was afforded by a comparison of findings in a group of lavanese held by the Japanese as prisoners and utilized as laborers in Noemfoor

CASE 7

Time Hear	Hlood Sp gr	Serum Sp. gr	Hgt. chart	Bar pret. chart	Твегару	Remarks
	974	I.Oal	22.7	7		
0.8	97	1.0161	1,8	67		
7					to ce enp	gra. Ca. graconata
J					soo c.c.alb.	gra. Ca. glucogai
16					1000 C. D-H	
7.5					600 c. c.alb.	
9	39	.oa63	\$ 7	6.7		Improvement evident
	· · ·				1,750 c.pl	
	57	0.06	40	6 5		
5					t,000 c. D-H	
-						Transferred

Island (Geelvink Bay New Guinea) and the findings on their captors members of the Tapanese Imperial Army (Table IX) The Tavan ese were a group of miserable looking individuals markedly emaciated ('skin and bones appearance) many too weak to walk several displayed large tropical ulcers on the lower extremities. Through interpreters they gave the now stereotyped story of starvation in the midst of adequate food supplies and overwork impelled by brutal treatment. In

TABLE IX -SPECIFIC GRAVITY VALUES IN ANEXIA OF MALNUTRITION

Sabject	Blood Sp. gr	Servera Sp gr	Heb.	Herb. Salail	Ser prot, chart						
3 vances prisoner	.oxg	.01	1.5		4.8						
Javanese prisoper	Lojo5	,Cts	3.8	4.5	5 5						
Javanese prisoner	.03	1.03	44	34	48						
J vanese prisoner	039	1,026	6,0	60	0.5						
Javaness princeer	,	013	4	14	5 47						
Ј тамене ријеског	18	1.014	66	7.2	1.8						
Japanese soldier	1.053	T-0 \$5	ц	145	6.1						
Japanese soldier	og6	2,095	E4.4	14 7	6.5						
Japanese soldier	1.057	Z.Daff	14	\$.1	7-4						
Japanese tokiler	<b>057</b>	.037	147	3 6	6.85						
) Denicas sejegas	0573	1.039	13	3.7	7 53						
Japanese soldier	070	ong		164	711						

Artificial light as background.

Associats of planta, gives were too small to effect algoriticant changes in several protein levels.

the same location the Japanese were robust and well fed. In the captives the specific gravity values were indicative of severe anemia and hypoproteinemia while in the Japanese captors the values were within the nor mal range. A correlation with the Sahli hemoglobin values was also obtained Blood and plasma infusions were given to some of these patients but the amounts were too small to alter appreciably the specific gravity values.

The treatment of anemia is demonstrated in a patient with malaria

CASE of This person had not felt well for weeks and had been very Ill for about 10 days prior to ad mission. An extraordinarily heavy infestation with plasmodium falciparum was noted on thick and thin blood amears. The patient was comatose and displayed a dry tongue and some loss of skin turgor The dietary intake had been poor The specific gravities (blood and serum) were 1 041 to 1 021 in dicative of prominent anemia and hypoproteinemia. Following 1 000 cubic centimeters t per cent der trose in saline, 1,000 cubic centimeters normal plasms roop cubic centimeters citrated blood (1) c hours after admission) the specific gravity figures were 1.047 to 1 023 An additional 2 200 cubic centimeters of citrated blood and 1,000 cubic centimeters of normal plasma were given (so s hours after admission) and 16 hours later the specific gravitles were 1.050 to 1.025. At 59 hours the values were 1.051 to 1.0245. The patient improved markedly. The transfusions seemed to be a definite adjuvant to the quinine and atabrine therapy in this case

#### DETIVIDENTION

If one considers that the clinical signs of dehydration (extracellular type with or with out intracellular dehydration) are reliable then serious grades of dehydration have not been encountered as frequently in the wound ed who have access to water as was expected. The clinical signs used include the urinary output and the specific gravity of the urine dryness of the mouth and skin thirst as ex pressed by the patient, loss of skin turgor and elevation of the specific gravity values of blood and serum. Of course the majority of the patients seen had sustained wounds of the extremities with or without fractures and could and would take sufficient water by mouth. Abdominal cases (intestinal perfor ation obstruction colostomy fistula cases) naturally presented more of a strict water

salt balance problem. One such case is pre-

CASE 10. This patient was seen 13 to 14 been idlowing the injury, shrapnel perfection of the siddomen. Alongs bowel and the surface of the wisary bladders are perfectly the bladder required ast at loss had been performed to the bladder required ast the loop of intention brought to the surface (ast supullized). The loop had broken down and probert A firthia.

On admission the patient exhibited signs of sever circulatory embarrassment (shock) come with reriods of restlessness, pulse very weak, blood pressure 00/60 millimeters bemoglobin, palenes, sirit sweating veins inconspicuous. The specific gravity values (blood-serum) were 1.008 to 1.0270, white the normal range. The shock was treated with dtrated blood (2,600 c.c.) and normal saline (1.000 c.c.) by vein. There was definite clinical improvement, consciousness was regained, the blood pressure reached 100/72, the pulse was strong and regular bat the nationt had a rayonnus thirst. There was lost of akin turror and the urinary output was periode At this time (7 hours after admission) the medic gravity figures were 1.06; to 1.038, an elevation of the blood value, which indicated a moderate com tration. One liter of a per cent dextrose in salme and aco cubic centimeters of normal plasma lowered the specific gravity value of blood to 1.053 (10 hours at ter admission) but it returned to an elevated value (1.061 to 1 028 by 37 hours after admission) At this time 2,000 cubic centimeters of dextrose salise and 500 cubic centimeters of normal plasma were gives and the values again dropped to 1 osy to Loris at 41 hours After an additional 500 cubic centimeters of normal plasma the values were 1.051 to 1.025. The patient was much improved, quiet but continued to ask for large quantities of water The bowd costs ued to discharge coplous quantities of fluid Addtional saline and plasma (2,000 c.c. and 500 cc.) were given to replace that lost through the assaure opening. After transfer this patient was reported to have done well.

Intravenous protein feeding When plasma solutions are administered by vein largely for the dietary value of the contained proteins, specific gravity values may be of use. Should the patient be receiving 1,000 to 2,000 cubic centimeters of normal plasma daily (60 to 100 grams proteins) and no significant alterators are noted in the concentration values from dry to day then one has a good idea that the similatered solids and fluids are being utilized. A case in point was a patient with acute caterihal jaundice and initial specific gravity values of 1 o52 to 1 o23. Eleven and one-hill hours after 1 250 cubic centumeters of normal

plasma were given the values were 1 050 to 1.0255 An additional 1 250 cubic centimeters of normal plasma were given and later the specific gravities were 1 052 to 1 027

#### EVALUATION OF STUDY

This study was begun by establishing nor mal values of whole venous blood and serum specific gravities for males of military age at sea level in a tropical climate. Then the ranges means and standard deviations were obtained. Significance was given to values out side of the range obtained by the mean  $\pm 2\sigma$ 

A comparison of the blood specific gravity values, the hemoglobin concentration as measured by Sahli's method and the red blood cell count gave a correlation similar to that obtained by Ashworth and Adams (1) Altera tions in the specific gravity values as produced by various solutions given by vein gave results similar to results in other studies (2 9 10 11)

Illustrations of the copper sulfate procedure as applied to the care of various types of abnormalities seen in battle casualties were pre sented. These concentration studies (specific gravity of blood and serum) were of great value in demonstrating trends in the make up of the circulating blood (hemodilution hemoconcentration anemia hypoproteinemia etc.) and to a great extent in demonstrating the seventy of trends. In conjunction with the clin ical picture (history physical examination etc.) the blood pressure level and the response to therapy they formed a valuable asset in the appraisal and therapy of the wounded.

#### CONCLUSION

The copper sulfate method for determining the specific gravities of blood and serum can be used to great advantage in the appraisal and treatment of various surgical conditions Additional evidence supporting this concluaion has been presented. The method is of par

ticular value in military use when several factors as the sudden arrival of large numbers of wounded men the necessity of rapid decisions concerning the shock state the appraisal of patients before anesthesia and operative procedures are instituted the need for medical judgment during attacks by the enemy make its simplicity speed, degree of accuracy and instant applicability most desirous

#### REFERENCES

- 1 Ashworth, C T and Adams, George, J Lab. Clin.
- M 1941 16 1934-1939
  2. Ashworth, C T Hutchinox Z. W., Payon, W F and Jester, A. W Am. J Physiol., 1944 140
- 580-507 3 BARBOUR, H. G and HAMPLYON W F J Am M
- Ass. 1927 68 01-94.

  4 BEST C H and TAYLOR, N B The Physiological Bans of Medical Practice. Baltimore The Williams & Wilkins Co 1943
- 8 KVIIIII SC 1048

  6 MAIDER A. Surg (570. Obst. 1934, 58 551-565

  6 Idem Principles of Surgical Care Shock and Other Problems. St. Louis C V Mosby Co 1940.

  7 CASTLE, W B and MINOT G R. Pathologic Physics and Clinical Description of the Amenias. New York Oxford University Press, 1956

  8. CRAY P A and ELLIOT A H. Am J M Sc., 1943
- 205 356-363 O. HILL, D. K. McMichael, J. and Sharpey Schaper,
- E P Lancet, Lond 1949, 774-776

  O. HILL, J M and MUTRIERAD, E. E. J Urol., 1942, Balt.

- 0. IIII., J at ann Attinuman, c. c. J Otto, 1997, Balt.
  147, 887-394. J Am. M. Ass. 1944, 126 674-677
  12 KARAN B M SOUTH M J 1943, 36 234-238.
  13 McMichard, J Am. M Ass., 1944, 124, 217-28.
  14 Mion, V II., Missach D R., Lexenza, M M and McGraw D J Am. M Ass., 1941 117 24, 2070.
  15 Mitselfand E. S Astrodam, C. 1 and Hits. J M.
- Surgery 1942, 12 14-23 16 MUTHEAD, E. E. GROW M. H., and WALKER, A. T. The administration of intravenous fluids to battle
- casualties with particular consideration to the shock problem. Unpublished. 17 MURRICAD, E. E., and HILL, J. M. Ann. Int. M.
- 1042, 16 286-302 18. PERERA, G A., and BERLINGER, R. W J Clin. Invest.
- 18. PERERA, G. A., and DELEGRAR, R. W. J. Cim. Invest.
  10.1) 23 35-25.
  10. PIRILLIPS, R. A., VAN SCHER, D. D. DALL, V. P.
  ESTERON, K. J. E., HARILTON, P. R., and ARCHI
  BALD, R. M. Bu. Med. News Lettler, Vol. 1, No. 9.
  10. SCOUDER, J. Blood School, Lettler, Vol. 1, No. 9.
  11. VICKUE, B. H., DARRICHO, C. D. 1940.
  11. VICKUE, B. H., DARRICHO, C. D. 1940.
  11. VICKUE, B. H., DARRICHO, C. D. 1940.
  12. VICKUE, B. H., DARRICHO, C. D. 1940.
- J Clin. Invest., 1933, 12 193-216. 22. Wiggers, C. J. Physiol. Rev. 1942 22 74.

### LUMBAR APPENDICITIS AND LUMBAR APPENDECTOMY

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SOMEWHAT rare form of appendi citis which may be mistaken for other conditions unless the symptoms are definitely understood, has not, to my present knowledge been clearly described It is a type in which the appendix is posterior and lies against the peritoneum dorsal to or below the cecum The general peritoneal cavity is not involved and the characteristic abdominal symptoms of appendicitis are absent. Without gross perfora tion and usually without intra abdominal pus formation, bacteria from the appendix penetrate the thin peritoneal layer and spread in the loose extraperitoneal connective tissue of the loin and pelvis, producing first a watery edema like that often seen in the deep tissues of the anterior abdominal wall from appendi citis, but with a much greater tendency to a spreading purulent, and necrotic process. The tela subserosa or extraperitoneal con nective tissue of the posterior abdominal wall and pelvis is much more abundant is looser contains more fat, and is less resistant to in fection than that of the anterior abdominal wall. There results from the lower involvement of the right extraperatoneal space a pelvic abscess, and from the upper type a right perinephritic abscess. Coincidentally inflammatory products within the appendix usually discharge into the cecum and the appendix undergoes resolution.

I have long believed that appendicits without intra-abdomial suppuration is a common cause of the so-called kitopathic perinphritic abscess. This concept, however apparently has received little attention from urologists, although Hugh Young mentions appendiceal abscess as a possible cause of

perinephritic abscess.

If an anterior abdominal incision is made in the early stages of lumbar appendicits with removal of the appendix, the operator may encounter nothing to direct his attention to

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the retroperstoneal inflammation. The pertoneum over the lumbar area is not necrotic or perforated and in the limited area not correct by the cecum, shows no greater inflammators change than that usually found continues to an inflamed appendix. If careful pairates were made a cushion-like elevation of the peritoneum dorsal to the appendix might be detected but I dare say few operators have considered such examination necessary With the lower type a large extrapertiment pelve abscess which later forms may be mistaken for and drained as a localized intropertunal collection Likewise the operator will over look the primary appendicitis when without opening the peritoneum, he drains only the secondary retroperitoneal or perinephnic Apparently the septic extension abscess. through the pentoneum is uncommon if the appendicitis leads to a plastic or purulent perstoneal exudate. In other words, the extraperatoneal extension rarely is associated with a gangrenous or perforated appendix

The signs and symptoms of the lower type of lumbar appendicitis are striking and, when fully developed very characteristic. The attack may start, as in the usual case of sppendicitis with epigastric distress, names, moderate fever elevation of the pulse rate, and polymorphonuclear leucocytom. The pain tenderness, and rigidity however de not localize at McBurney a point but rather in the right lumbar muscles above the crest of the ilium. Medial to the right anterior smer ior spine of the ilium the signs of appendicts, such as local tenderness, muscular rigidity and the Iliopsoas and obturator tests, may be entirely absent The patient however may complain of pain and tenderness over the anterior surface of the right thigh, of the right scrotum or in the female of the right lablum majus. In the inflamed extraped toneal connective tissue back of the cecum le the genitofemoral nerve, the external sperms tic branch of which innervates the cremester and scrotel or labial skin, and the himbounguinal branch, supplying the skin of the upper anterior thigh. From involvement of the lateral femoral cutaneous and the femoral and obturator nerves symptoms referred to the lateral surface of the thigh, lower anterior surface or medial surface of the thigh, or knee also, may be produced. As the ureter runs through the intensely inflamed connective tissue, ureteral colic and hematuria may be present. The characteristic syndrome of lumbar appendicitis is lumbar pain tender ness and muscular tension associated with pain in the anterior right thigh, testicle or labium to which may be added vesical irrita bility and hematuria A degree of lumbar scoliosis with concavity to the right may develop and later from the inflammatory exudate, the margins of the right psoas muscle may appear blurred or the muscle shadow obliterated on roentgen examination

The pathological changes can be appreciated only by an incision exposing the extraperatoreal connective tusue in the right lumbar and iliac regions together with the

appendix.

In operating an oblique incision is made above the creat of the right ilium along the fibers of the external oblique which are separ ated and partly divided. The retropentoneal connective tissue space is entered and evacuated of the inflammatory exudate and wiped dry The peritoneum is opened by a small incision behind or below the cecum through which the appendix is delivered. The mesoappendix is clamped and divided in sections and the base of the appendix doubly ligated and divided by a cautery between the clamps and beyond the ligatures The mesoappendix is ligated over the stump of appendix in sec tions with one of the ligatures. As a rule the opening in the peritoneum may be closed with 36 gauge alloy steel wire and the septic retroperitoneal space drained the wound being closed about the drain with layer sutures of No 32 wire The retrocecal appendix hes against the peritoneum and is accessible from

The following is the report of a typical case of lumbar appendicitis

Mr H B 22 years of age a medical student be came III in the afternoon with generalized dull aching abdominal pain after eating Chinese food At 6 o clock the following morning he had a severe chill was nauseated and vomited and at 10200 a.m. he entered the accident dispensary of Temple Uni versity Hospital with the diagnosis of a right unnary tract calculus as it was thought that the urine contained blood. At this time the hemoglobin was 13 5 (79 9 per cent) erythrocytes 5 030 000 color index leucocytes 13,800 polymorphonucleurs 82 lymphocytes 13 monocytes 3 eosinophiles 1 nonfilaments 51, filaments 31 urine clear, no sediment, acid, cloud of albumin much amorphous material, blood urea nitrogen 45 milligrams plasma carbon dioxide o so The abdominal ache disappeared and there were several diarrheal movements. A month previously he had had a transient acute abdominal attack with names, vomiting and constipation )

In the afternoon he was transferred from the accident dispensary to the hospital with the impression that he had an acute gastroduodenitis and possible stone in the right kidney or ureter. His temperature then was 1033 pulse 86 respiration 22 leucocytes 26 000 polymorphonucles rs 80 non filaments 78 filaments 11 blood ures nitrogen 60 milligrams, urine 1028 no casts or blood cells

occasional leucocytes

The patient a well developed and heavily muscled young man was seen in consultation about 4:00 p.m. He then was complaining of pain and sensi tiveness in the lower right loin the anterior right thigh and in the right testicle. There was no abdominal distention muscle resistance or tenderness Posterior to the line of the right anterior iliac spine and above the crest of the right illium was a painful area with marked tenderness and increased muscular tension. With a diagnosis of retrocecul appendicitis. and secondary lumbar phlegmon operation was per

formed about 4 30 that afternoon, An oblique o centimeter skin incision was made about 2 centimeters above the right flux crest. The fibers of the external oblique muscle were separated and the lumbar fascia and subpentoneal connective tissue (which were greenish seminecrotic, mal odorous, and contained 60 to 00 c.c. of pus) were exposed. The area was mopped out and a 3 centimeter incision made through the peritoneum under the cecum exposing the appendix, which was swollen, injected and very lightly attached to the peritoneum but without perforation or plastic exu date. The peritoneal surface was moist from a very small amount of turbid odorless fluid. The base of the appendix was doubly ligated with No 32 alloy steel wire, divided by cautery the mesosppendix ligated over the stump with one of the ligatures, and the peritoneal opening closed with fine wire autures. The wound was lightly united with interrupted were sutures around a drain extending extraperitoneally from the pelvis

Pathologic report. The appendix measured 5 by 1 centimeter and was not perforated. The serosa was thickened and injected, the lumen narrowed but not obliterated. The mucosa was infiltrated by plasmocytes lymphocytes, eosinophiles and neutrophiles, the epithelium lacking in many places and the glands replaced by fibrous connective tissue con taining inflammatory cells. The picture was that of a healing acute appendicitis with evidence of a previous inflammatory attack. The day following operation the urine contained a few red cells and leucocytes.

The patient had an uninterrupted recovery and was discharged from the hospital 15 days after the operation.

#### BUMMARY

A type of appendicitis is described in which the inflamed organ has a posterior or retrocecal position, and from which the infection spreads through the thin contiguous peritoneal layer with little abdominal reaction and produces a spreading phlegmon or abscess in the poorly resisting loose areolar tissue of the retroperitoneal space in the right lumbar and pelvic areas. As the signs and symptoms are predominantly in the right lumbar region, I have termed the condition 'lumbar appendi The appendicitis tends to subside spontaneously probably largely by discharge of inflammatory products through the open lumen of the appendix into the cecum and is associated with so few characteristic symptoms as to be overshadowed in the later development of a pennephritic or pelvic abscess. In those cases in which the appendi ceal symptoms are more definite the retro-

peritoneal extension may be diagnosed and

drained through the abdomen as a localized intraperatoreal collection.

The initial symptoms of lumbar appendicitis usually are abdominal colic, names and fever soon followed by pain, tenderness and muscular rigidity in the loin, but with a degree of fever and possibly a chill unusual in scute appendicates. This condition is to be at tributed to the greater toxic absorption from the retroperatoneal space than from the peritoneum. Especially characteristic are symptoms due to the irritation of structures surrounded by the inflamed extraperitonal connective tissue, as the right genitofemoral, lateral femoral cutaneous, femoral and obtuntor nerves and the ureter. The syndrome of Dain, tenderness, and rigidity in the lower right loin with pain and tenderness referred to the right testicle and anterior part of the next thigh, occurring after a brief abdominal at tack, is quite diagnostic. In treatment it is important that the

appendix be removed and the phlegmon drained through a lumbar or retroperitored approach otherwise the surgeon may remove an inflamed appendix and overlook the retroperitoneal phlegmon, or drain the pelvic or perirenal abscess and overlook the appendix With removal of the appendix the peritoneum may be closed, or drained with the lumbar pelvic space through a single lumbar increon.

# CORRECTION OF BLOOD LOSS DURING SURGICAL OPERATIONS

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THE study of blood changes produced by hemorrhage has received much attention in the past. Considerably less is known about the changes produced in the circulating blood by various types of anesthesia, the intravenous injection of fluids and the various exigencies of major surgical operations. These variables are so numerous that systemic consequences of trau matizing operations are not reflected in the circulating blood and the determinations of hematocrit, hemoglobin or plasma proteins give little information as to the quantity of blood lost or of pending shock Support for this statement is found in a brief review of the hterature and in the analysis of the blood changes of 35 patients undergoing major sur gical operations to be presented

Dyson, Plaut, and Vaughan observed the reactions to changes in the blood volume resulting from the removal of 540 millihters of blood from 8 healthy donors in whom many of the variables were reduced to a minimum They noted that in only one instance the change in blood volume as determined by the dye method was found to correspond to the calculated value. In the others dilution or overdilution was associated with an increase in mean corpuscular volume suggesting that some of the fluid replacing the blood lost was absorbed by the red cells. The authors also point out that blood loss may occur without affecting the hemoglobin level

A rarely considered variable in the normal individual undergoing blood loss is the uncer tain amount of blood expressed from the spleen. According to Lewis, Werle, and Wig gers, the spleen contracts vigorously during hemorrhage, and may shrink to a volume of 50 per cent or less of its original size. Wu in

1943 found the capacity of 20 spicens to vary from 60 to 400 milliliters, a volume which may be added to the blood volume during hemor rhage

Thus it is evident that, even in simple un complicated hemorrhage in relatively normal individuals variable factors contribute to make changes in hemoglobin plasma proteins, and hematocrit unpredictable. To these factors must be added the inherent differences present in each surgically sick patient and the various methods used in treatment. In general, surgical operations anesthesia shock varying degrees of dehydration and malnutrition fever anemia hypoproteinemia, and in travenous infusions of crystalloids plasma and variable whole blood all contribute to changes in the circulating blood.

Windfeld, in 1937 made direct measure ments of blood lost during operations and demonstrated that determinations of hemoglobin concentrations before and after operation failed to give quantitative information regarding the amount of blood lost.

Stewart and Rourke, recording the changes in the volumes of blood and interstital fluid during operations under ether anesthesia, stressed the fallacy of assuming a quantitative relationship between changes in concentration of hemoglobin or plasma proteins and changes in plasma volume. From their observations reduction in plasma volume may be greater than can be accounted for by hemorrhage.

Ariel, Pack, and Rhoads compared liver blopsy specimens secured at the beginning and the end of gastric operations and found that hepatic cells usually swell during surgery. The average increase in total liver water was 1 I per cent. By inference, the red blood cells also may take up some of the fluid transferred from the interstitial space to the blood stream.

In March 1945 Evans published conclusions resulting from the recent studies of three

Aided by Grant from the Horace H. Rackham Fund. From the Department of Surgery University of Michigan Medical School, Ann Arbor Michigan.

TABLE L—BLOOD LOSS AND CHANGES IN HEMATOCRIT HEMOGLOBIN AND PLASMA PROTEINS IN OPERATIONS ON THE THYROID

i	1			1	71:	44. m	L		Flood long	•	Hemstocht	Remodela	7
atient under	App cad	Weight kgra.	Dere- tion, sein.	Нуре-	g per cent Gluces	ga- lune	Blood	=1	Per cent tetal blood volume	/ W CO.	Percentile change, participantive		
	53-F	43	1100		1400			44	- 3 3	- 8.3	14.5 — 0.9	-11	
,	z4- <b>3</b> 1	47	ih.					eri	-75	-75	48 4 -10	-16 j	7,4
٠	4#-F	68	1404		****			400	- 0	-0	-,6	п (	7.55
	11-F	6.5	614		000			204	- 11	-11	46	14.1	9 70
3	58-M	2	Į.		Loca			120	- 6	6	#4.4 - \$ 9	7	7 38
164	9-F	**	eu†		1800			775	-17 8	~m7 \$	41 4	-1,	714
Ð	<b>7-7</b>	10	1		1000			641	-16.4	-96 4	39 3	-44	65
TIME?	ercentile	chante	_						<del></del>	-re 7	- ;	-14	

\*Tribromeethanol, nitrous exide and other !Tribromoethanol, mirrous exide, lecal promine

separate shock research groups (of New York, of Atlanta, and of Richmond) in which estima tions of blood volume were made by means of the dve method. He presented simple reasons why the determination of hemoglobin and plasma proteins does not suffice in estimating the blood volume in surgical patients. He pointed out that 'in whole blood loss almost equal quantities of red cells and of plasma are missing so that hemoglobin and plasms protein concentrations will be relatively unchanged and the surgeon is given a false sense of security In situations when moderate quantities of red blood cells and much plasma are lost, there will be hemoconcentration yet there is no indication of red cell loss. Only in situations of relatively simple plasma loss (such as peritonitis and some burns) will hemoglobin and hematocrit give an accurate picture of the trend of blood volume alter ations.

Introduction of intravenous fluids further compilicates the picture. Although Bogert, Underhill, and Mendel found, in 1916 that the blood volume of rabbits injected intravenously with saline returned to normal 30 minutes after the injection later investigations have shown that alterations in blood volume following intravenous infusions last

much longer Gilligan, Altschule, and Volt found that the blood volume increases after intravenous fluids may not return to the nor mal level for 2 hours.

The blood at the end of operation is this resultant of these variable influences, and it becomes impossible to select any one cherical determination indicative of the condition of the postoperative patient, unless it is the determination of the plasma volume, a labor ious and often unsatisfactory procedure in the seriously III patient.

In support of this statement, the data compiled from the determinations of hematomit, hemoglobin and plasma proteins of 35 pa tients before and after major surgical oper ations are presented in Tables I through VI. In each instance the preoperative value is recorded and below it the percentile change from the preoperative value obtained at the end of operation. The blood lost at operation was determined and has been reported eswhere (4) Heparinized blood was used, and a 2 millillter sample sufficed for the 3 deter minations. Hematocrit was measured in sealed, capillary tubes spun until no further change in cell volume occurred. Hemoglobia was analyzed as oxyhemoglobin by the photoelectric method of Evelyn on 20 cubic mili-

TABLE IL—BLOOD LOSS AND CHANGES IN HEMATOCRIT HEMOGLOBIN AND PLASMA
PROTEINS IN MASTECTIOMY

					r:	dds, mi			Blood ion	ļ.	Hernatocrit volume	Hemoglobin	Plearne proteins
Patient pauder	Age stad less	Wedgehrt legen.	Dura- tion, mis.	Hypo- termon	g per cent Olucuse	Sa- lune	Blood	an).	Per cent total blood volume	Per cent cor rected	postoperative	Percentle change postoperative determination	Percentile change postoperative determination
1	19—F	07 7	147*	+	000		,	817	- 8	- •	43 3,	-5,,	7 st -6 7
3	61-F	64	2434		000	~	90	670	- 3 8	- 8 7	43,0	13 6 - 5	7,9
\$7	4-3	85 9	E10*	++	900	•00	450	024	- 7 8	- 8 3	47	25 6 -14 7	7, 5
19	34-7	72	168*	•	1300			339	-24 6	-24 6	43.3	- 1 o	7 86 - 7 3
40	55-P	63.0	154		1000	5	275	∞,	-25 8	- 94	45 7	- 3 - 3	1 14 -6 3
Average y	ercentile	CHAZUE							- 7 4	- 8	- 1	-15	-1

"biltrom sakis, exygen and other

neters of well mixed blood measured in the falling drop pipet with the aid of a Guthre pipet holder. This procedure was adopted to avoid the maccuracies of the 20 cubic millimeter blood pipet. Plasma proteins were determined by the method of Barbour and Hamilton and by the use of Weech's formula. Hemolyzed plasmas were corrected for hemoglobin by an adaptation of Evelyn's method before the plasma proteins were calculated from the plasma specific gravity.

Table I is concerned with the changes occur ring during thyroidectomies. In this group only 1 patient received no intravenous fluid. This patient (3) lost 227 milliliters of blood or 7.5 per cent of his total blood volume. A comparison of the percentile changes of both hematocrit and hemoglobin (-10 1 per cent and -10 3 per cent, respectively) and the calculated blood loss (7.5 per cent) indicates an overdilution, similar to the reaction of healthy donors to the withdrawal of blood.

All the other patients in Table I received 5 per cent glucose intravenously during the operation. Patient 10 with a blood loss of 204 millihers or 5 3 per cent showed little or no tendency to hemodilution above that of the blood lost, in spite of 1000 millihers of glucose infused during the operation. In other words, approximately 750 milliheters of fluid have left the blood stream during the operation.

Treal blood volume was calculated from the verage values deter stied by Gebran and Evan, 77 5 multifliers per informs of body wright is the mais and 60 millibiters per kilogram in the female In contrast, patient 15 showed changes in hematocrit (-5 9 per cent) comparable to the blood loss (-6 0 per cent) but both hemoglobin and plasma proteins remained unchanged This instance suggests an absence of hemodilution and even a shrinkage of the red cells

Patient 16 was operated on for a very large tone gotter. In spite of the large blood loss of 725 milliliters, 28 per cent of the total blood volume and the infusion of 1000 milliliters of glucose there was no evidence of hemodilution. Later patient 16b during the second stage of the hemithyroidectomy showed a similar reaction. These findings suggest the rapid disappearance of the intravenous fluid and the absence of hemodilution after large losses of blood.

Table II presents the results of studies during radical mastectomies. Patient 1 received room milhiters of glucose during the operation which involved a blood loss of 821 millifliters or 12.8 per cent of the total blood volume She developed mild hypotension. The per centile change in hemoglobin (-15 3 per cent) corresponded to the blood loss (-12 8 per cent). The hematocnt change (-2 3 per cent) is rather indicative of increase in mean cornuscular volume.

In patient 29 with a loss of 14 6 per cent of the total blood volume, the change in hemoglobin (-18 9 per cent) and in plasma proteins (-17 3 per cent) corresponds to the blood loss with a tendency toward overdilution while

TABLE III.—BLOOD LOSS AND CHANGES IN HEMATOCRIT HEMOGLOBIN AND PLASMA
PROTEINS DURING COMBINED ABDOMINOPERINGAL RESECTIONS

	(				_ n	olde, mi	L		Blecd less		Bestscit	Managhata	7-
Patient number	Age and sex	Wadght legm.	Dens- tion, mis.	Нуре- інсина	Checese Cont t per	la-	Blood	=1.	Per cent total bicosi volume	Per cond cor- rected	Percentile Change, postaperative	Per Const.	=
_,	60-M	13	97*	++	1900			183	- 4		18.4 +10.7	77.0	12
3	\$5 <b>-F</b>	62	I.8e⁴		2000		_	41	- •	-•	45 7 -14 4	4.6	·r,
,	49-71	38	1450		440	400	450	F23	-rs 6	- •	41 B	IJ	1,0
4	61-F	H	150		900	300	490	\$10	- 3 5	- 1	41 3,	23.3	14
41	40 X	45 9	200°	+	20000		450	474	-13 3	0.8	30.1 10 4	- 1·1	1,0
14	70-L	57	15+	+	·	800	300	read .	- 5 5	-10.3	-7 6	-6.3	14
14	to-F	33 7	100	+++	1000	300	15	47	- 7	1	- T-1	-1 <sub>L</sub>	1,3
90	48-F	7 8	2457		1900			494	-10 4	- 4	77 t	.p.7	7 4
34	73-M	37-3	161	+	900	90	-	P33	- 11	++	40	27.	46
36	54-F	62 7	\$7.		1000		470	,£)	-1 6	- 1	30 5	17.34	4 76
M	15-34	76 0	zāst	+	700	400	240	\$75	- 6 3	+ 1	¥°3,9	F* 4	12
4	48-M	64	reet	+	£300	75	•	304	6	- 17	47 7	-11 \$	6.4
-	er cont Be	change	_							-1	-1	- 1	<u> </u>

\*Continues spinsi, protsine tikonal, supercarse

the hematocrit (-11 1 per cent) is indicative of cellular swelling

In these mastectomes the changes in hemoglobin compared more closely with the blood loss than did the changes in hematocrit or plasma proteins. However even the hemoglobin changes are often misleading Blood losses were large averaging 800 milliliters and hypotension occurred frequently

Patients undergoing combined abdominoperineal resection for carcinoma of the rectum are represented in Table III Here the average changes in bematocrit (-5 1 per cent) hemoglobin (-8 0 per cent) and plasma proteins (-6 6 per cent) correspond faulty well with average blood loss (-3 2 per cent) but suggest a tendency toward overdilution. Individually this ideal correlation exists in only one in stance, patient 30. The other cases show con suderable variation. For example patient 7 sustained a blood loss of £83 milliliters (4.1 per cent) of the total blood volume. This patient's reaction to the small loss of blood was a charge in hematocrit of +10.7 per cent, in hematocrit of +10.7 per cent, in hemoglobin of -17 for per cent and in plasma proteins of -1 x per cent. A fairly pronounced hypotension may have been responsible for none of these shifts.

Difficult and prolonged surgery for dissess of the bilinary tract provided the case in Table IV. In these patients hypotension is frequently a prominent part of the surgical picture. In spite of the eristing marked hypotension patient 18 presents blood change comparable to the hemodilution resulting from a blood loss of 8 per cent. On the other hand patient 21 after a corrected blood has of 14.4 per cent (total loss less transfused during operation) showed a hematoric change of -4 5 per cent, and a plasma protein change of -11 i per cent.

TABLE TV -- BLOOD LOSS AND CHANGES IN HEMATOCRUT HEMOGLOBIN AND PLASMA PROTEINS DURING SECONDARY AND PLASTIC OPERATIONS ON THE BILIARY TRACT

	Age and sex	Weight kgm.	Dera- tion,	Hypo- tension	Finicia, ral.			Blood loss			Hematocrit volume	Hemoglobia gra.	Pleana proteins
Patient number					g per cesat Ghaces	Se- Im	Blood	ml	Per cent total blood volume	Per cent cer rected	per cent Percentile change, postoperative determination	per cent Percepcile change, postoperative determination	gra. per cent Perceatile change, postoperative determination
11	po-F	61	1050		1000		۰	138	- 30	1 9	46.6	_ <sup>5 9</sup> 6	7 58 0
14	\$4-M	90 3	317	+	6aa	50	140	41	- 1	-•	43 1 +14.6	# 1	+7;42
	g=M	74 0	25*	++	1900	375	6 5	1455	-27 5	-I4 4	40 4 - 4.5	+ 5	- 6 40 - 1
	30-M	<b>8</b> π	34		1000	700	270	14	- 3 8	- 4	‡° %	10 6 + 1 6	+ 9
18	14-80	65	85*	++	1000			406	- 1	- 8	50 J - 4 B	- 7 z	-76 <sup>80</sup>
11	s -F	7	60*		1000			<b>s</b> 87	- 6	- 6	+4,5 <sub>6</sub>	14, o	7 s8 + 1 4
39	34-F	41 8	180*		po	5	\$o	454	-16 4	- 6 5	±°,1,		7 93
41	fr-F	30 3	130*	1-1-1-1	90	to	480	1065	-41	-22 6	_44 _ 5 7	14 6 14 9	_7 45
Average	verage perceptile classes: biliery tract										+::	- 4 8	-4

<sup>&</sup>quot;Nitrous oxide, oxygen and other

TABLE V -- BLOOD LOSS AND CHANGES IN HEMATOCRIT HEMOGLOBIN AND PLASMA PROTEINS, DURING OPERATIONS FOR COMPLICATED GASTRIC LESIONS

			[		Fh	rida, rei	L		Blood loss	•	Hamatocrit volume	Hemoglobia	Pleama proteins
Patient number	Age and sex	Weight kgm.	Dura- tion, min.	Hypo- tensor	g per cent Glacose	ı£.	Blood	n.l.	Per cent total blood volume	200	postoperative	per cent Percentile change, posteperative determination	gm. per cent Percentale change, posteperaliye determination
6	6a-F	59 6	8\$7°	+++	3000			553	-14	-14	40 5 +12 4	13 7 - 5	6 60 +13 3
•	69-M	1 8	270*		300	700	900	804	-90	+ 4	4"s 1	+44	+5 99
311	to-M	60 g	550		1000			3	- 6 8	- 6 8	47 3 + 5	13 7	6.45 + 7.7
Average	Average percentile change: gastric lesions										+,	+	+ 7.6

TABLE VI.-SUMMARY

		A	verage blood is	-	Average purceptile change			
Operation	Number cases	mL	Per cent	Per cent*	Hematocrit	Hemoglobia	Planus protein	
. Thyroldectomy	6	373	- 7	- 1	-5	-44	-,	
Redical mastectomy		804	- 7 4	- 1	-s	-13	-1	
Combined abdominoperinaal resection		41	- 9 5	- 1	-5 z	- 8	-6 6	
. Billary tract	•	\$94	-z4 6	- 8	+1 1	- 4 8	-4	
Gentric Issiens	1	977	-11 6	-6	+7	+	+7 0	

May replacement of blood during the operation.

Vitrous oxide, oxygen and other

As mentioned before Pack and associates (1) demonstrated swelling of liver cells in na tients following operation on the stomach. The cases presented in Table V show evidence of swelling of red blood cells as shown by the increased hemotocrit

Table VI summarizes the average blood losses and the average changes in hematocrit. hemoglobin and plasma proteins. losses calculated from the changes in hematocrit, hemoglobin, or plasma proteins would lead to an underestimation of the need for replacement in mastectomies thyroidectomies, biliary tract surgery, and pastric lesions. In combined abdominoperineal resections, the individual estimates would also be uncertain in spite of the fact that the average values shown in the series correspond fairly well to the blood lost.

#### COMMENT

Thus, an analysis of the findings in the 35 cases here presented furnishes further evidence that no easy practicable laboratory procedure will indicate the status of the circulat ing blood in the postoperative patient.

Studies of blood loss invariably show that the loss is almost always greater than the surgeon estimates. It is becoming widely recognized that the only wholly suitable replacement for operative blood loss is whole blood and that the greatest benefits result when the blood is given as the loss occurs.

The surgeon therefore, should plan in ad vance for the adequate replacement of the deficiency caused by bleeding during the oper ation. To do this, he must usually rely upon his own knowledge of the amount of blood loss to be expected in each case. Recognizing this fact the present authors, in a previous publi

cation (a) tabulated the average blood losses occurring during the usual types of operation as calculated from 626 cases reported in the literature

#### CONCT HETONE

Whole blood is required adequately to replace blood lost during surgical operation The replacement is most effective when whole blood is given as the loss occurs.

The amount of blood needed in each err gical case can seldom be determined directly Hemoglobin hematocrit, and plasma protein concentrations fail as an accurate measure of this need. Plasma volume determinations are more accurate, but are too labonous and time consuming for routine use

A knowledge of blood loss during operation as available in the literature offers a practical basis for planned transfersions during oper etion.

#### REFERENCES

- L. ARIEL L. PACK, G. R., and RECADE, C. P. Ann. Sory 1042 116 024. 2. BARROUR, H. G., and HAMILTON, W F J Riol Cher.
- 976, 69 635 3. BOOKET, L. J. UNDERSHILL, F. P. and MIRROIL, L. R. Am. J. Physiol., 916, 411189. 4. COLLER, F. A., CROOK, C. E., and Ion, V. J. Am. M.
- Am. 1944 126 1 S. DYSON M. PLAUT G., and VADORAN, J. Q. J. Esp.

- 5. DIRROY M. PLAUT G., and VACULAR, J. Q.J. EXP. Physiol., Lood 1944, 39 315.

  6. Evars, E. L. South, M. J. (194, 33 144.

  7. Evaryer, K. A. J. Riol. Chem., 1958, 15 61.

  6. GIRROW J. G. H., and Evarse, K. A. Ja. J. C. Invest., 1931, 6; 137.

  6. GILROWS, D. R., ALTHOUTER, M. D. and VOLK, M. C. J. Clin. Invest., 1938, 7; 7

  10. LEWIS, R. N. WHELE, J. M., and WIGGERS, C. J. Ann. J. Directol. 2018. 13 dec. 2018.
- Am. J Physiol., 1043, 136 soc. STRWART J D and ROURER, G. M. J Clin Invest
- 1038, 171 413.
  12. WEECH, A. A., REEVES, E. B., and GOTTICHE, F.
- J Biol. Chem., 1936, 1 3 107
  13. WHENDELD, P. Acta chir scand 1937 79 433
  4. Wu P P T. Surg, Gyn. Obst. 943, 77 14

#### PATELLECTOMY IN THE MILITARY SERVICE

#### A Report of 19 Cases

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HE subject of patellectomy or complete excision of the patella has long been a controversial one. Those opposing the procedure argue that if the patient regains complete flexion of the knee there is resulting limitation of extension and conversely if he has complete extension he cannot fully flex the knee (Fig. 1a b)

We believe that patellectomy can be a very successful operation and that patients with complete patellectomy can have normal knee function. Many operations have been devised for this procedure each claiming some special advantage. We carry no banner for any particular operation, but believe only that the essential aim should be to eliminate the slack in the quadriceps tendon which is created when the patella is removed.

The amount of slack to be eliminated has not been adequately defined in the literature Consequently we have herein attempted to clarify the subject on a mathematical basis, although realizing that the figures used are averages and do not apply to any given case For purposes of the computations we have accepted 2 centimeters as the average thick

Presented at the meeting of the Chicago Orthopedic Society April 3, 945, at V ughan General Hospital, Hines, Illinois. ness and 5 centimeters as the average length of the patella, and we have further assumed that the quadriceps tendon drops the entire 2 centimeters when the patella is removed (which is not entirely true in view of the thickness of the quadriceps tendon itself) We have computed that this portion of the quadriceps tendon becomes lengthened to about 6.4 centimeters or a gain of about 1.4 centimeters.

Since muscle power is directly related to the length of the individual fibers and hence to overall contractile length it can be readily seen that a gain in length of 1½ centimeters would be disastrous to function both in strength of the quadriceps and in range of extension of the kinee. This point has not been adequately clarified and for this reason we misst that the elimination of the slack is the important principle in the operation and that it makes little difference whether the patella is reached through a transverse parapatellar or other approach.

The operation we have used is as follows (Fig 2) The patella is approached through a short median parapatellar incusion. A straight longitudinal incusion is made through the quadriceps expansion in the midline of the

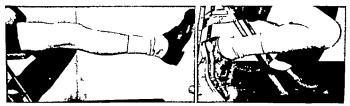
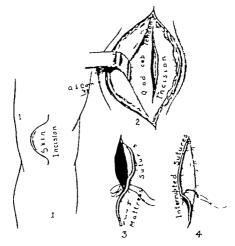


Fig. 1 Patient A.L., aged 24 years. Chondromalacia a patellac of right knee a and b, Photographs made 8 weeks

 after operation demonstrate restoration of full range of extension and flexion.



lig Incissors and method of lateral plication. , Median parapatellar skin incusion Longitudinal incision of quadriceps tendor in midina of pat lis. Patella partially exposed ith beginning undermining of tendon anteriory. 3 and 4. Patella connect Lateral plication performed with knee in full extension, by use of N. oo black fills matterns unterest.

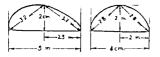


Fig. 3 left. The are is assumed to equal its chord. Appheation of Pythagurean theorem above above to qualify the property of t

patella, extending 1 centimeter above and below the limits of the bone. The expansion is then removed by sharp dissection left is intact as possible and the patella is removed after cutting through the synovial attachments The quadriceps tendon is then plicated laterally a distance of 16 centimeters at the midpoint and tapering toward both ends. This figure is arrived at as before by assuming the thickness of the patella 15 2 centimeters, the width as 4 centimeters, and the slack to be eliminated being computed a 1 6 centimeters (Fig 3) In actual practice if one merely plicates all the available there in the lateral direction without tension the result will be the same However this plica-

TABLE I -CLINICAL RESUME OF 19 CASES OF PATELLECTOMS

		Injury	Infection	Duration symptoms preoperative	Postoperath	Fun	ction	Symptoms	
	Years years				to July 1, 945	Preoperative	Postoperative	Preoperative	Post operative
	80	Fracture comp. compla	N	8 mon	5 mos	Normal	Normal	Pain, sw. littag	N
	3	Fractore comp consessa	6 wks	блука	ó mos	80- 10	<b>3</b> o~ go	Pam, se lling	١٠,
3		Fracture comp commin.	N	53% mm.	j mos.	70- go	180- 90	Marked pain, swelling	N
+	70	Fractore corep.	1	9 2509.	ا درا ا	<b>8</b> 0− ∞	\$0- go	Pain, grating	\₀
5		Fractore comp commin.	N	5 Those	0 mos	70- bc	80- 95	Pau	<u> </u>
6		Fracture comp commin	10	7 mos	, Le.	So-	5o~ oo	Pain, grating	Ν
7	34	Fracture comp	7 Wks	434 mos	4 4/7	80- 55	<b>3</b> 0~ ∞	Pain, grating	Ŋ
		Fracture comp. commin.	ntor. (pecked open)	35 mos.	3 2000	50~ to	Bo- 90		_
9	3	Frecture comp	N	3 mos	7 444	5o- 6o	50~40	Paus, grat og	Ν.
10	30	Fracture comp contrain	`	day	7 ED04	Normal	Ro- 90	( seshot outed	Y.
	24	Chondromalacia	N	5 mos	EDO*	<b>3</b> 0~ 70	80- 40	Pain, lling	`
	24	Chondromelacia	No	4 1906	35 TB01	80- 60	80- 40	Para, swelling netability	`
3	25	Chondromaleria	N	XDO#	15 ED01	80- 45	8o- s	Pain, swelling instability	N
14	300	Chendremalecia	No	7 Mari	g ks	80- 45	<b>3</b> o− 6o	Pane, caknese	`
3	29	Chondroma)ecia	N	j mos	4 Wks	8a~ 6a	80- 40	P 10, weakness swelling	<u>_</u>
٥	20	Chondromalecia	N	555 mes	4 wk	80~ 45	80-40	Instability grating	
7	2.5	Chondromalacia, tear internal meniscus	N	3 37%	wtu	Normal	<b>8</b> 0− ¢0	Instability grating jocking	N
1	*	Deslocation chondromalacia	No	4 2001	o ka	75 90	\$o- 70	Pain, gratiag	N _
0	1	Fracture, simple	N	35 mos	2006	rós oo	50- 40	Paus, at time	Λ _

tion must be performed with the knee in full extension since in flexion the slack will be leasened and the computations made become invalid. The plication is done with No cosilk, reinforced with single sutures. The subcutaneous tissue and skin are closed as usual

Postoperatively the patient is immobilized in balanced suspension with the knee in full extension for 1 week and is then started on active exercises. Quadriceps setting is begun in 24 hours. Patients can usually begin weight bearing within 2 weeks.

The conditions for which patellectomy is most often indicated are recent comminuted fractures old fractures with roughening of the articular surface of the patella or femoral condyles chondromalacia patellae and dislocations habitual or recurrent of traumatic paralytic, or congenital origin. In addition removal of the patella may be indicated in the treatment of degenerative arthritis local septic lesions and tumors of the patella.

#### CLINICAL MATERIAL

Nineteen total patellectomies are now avail able for study data are presented in Table I In patients with chondromalacia patellae

as the underlying pathological process there

has been a normal range of motion preopera tively but with associated knee joint symptoms. Postoperatively in all cases, there has been a rapid recovery of normal motion with a subsidence of all symptoms.

In those cases in which there has been limi tation of joint motion preoperatively as in the compound fractures there has been a definite improvement in the range of motion although normal motion has not been attained We believe that in these cases failure of return of normal motion is due to associated intra articular damage found in all cases on the roentgenograms and at the time of sur gery In this respect it is noteworthy that there was normal motion preceding and fol lowing patellectom; in patient M J with a comminuted fracture of the patella due to a perforating bullet wound in whom there was no demonstrable associated joint damage All natients have been relieved of their knee loint symptoms and excellent function has resulted in spite of the limitation of motion.

We have concluded that whereas in all cases the patient is allevanted of his knee joint symptoms and has shown an improvement in or normal restoration of motion this postoperative return of joint motion has been

conditioned by the range of motion entire prior to surgery

#### CONCLUSIONS

I While we hold no brief as to the incision used for removal of the patella, we believe that the median parapatellar skin incision and the longitudinal incision of the tendon are best adapted to the method of lateral plication.

2 The slack to be eliminated by the method of lateral plication has been computed to be 16 centimeters with the kine in full extension.
3 In this series of 19 patellectomies, (so compound comminuted fractures, 8 cases of chondromalacia and z ununited simple facture). all patients have been relieved of kine iolaint symptomia.

Whereas all patients have shown improvement in or normal restoration of function postoperative return of function has been coditioned by the range of motion eristing prior to surgery. Those patients who have had a normal range of motion before surgery will regain a normal range of motion following removal of the patiella those patients will imited motion preoperatively due to associated joint damage have shown a measurable improvement in range of motion.

# BRONCHOPNEUMONIA FOLLOWING ETHER ANESTHESIA IN OBSTETRICS

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SERIES of cases of bronchopneumonia has been observed in patients on the obstetrical service at Cleveland City Hospital These bronchopneumomas observed within a few days following delivery were variable in extent transient in nature and were not associated with clinical evidence of serious illness. They were discovered in almost all cases by means of a roentgenogram of the chest made to investigate the significance of slight fever or rales in the chest developing after delivery. The anesthesia in these cases consisted of ether admin istered usually by the open method and preceded by varying quantities of barbiturate and other premedication. The mechanism by which the pneumonias were produced was probably the aspiration of mucus or vomitus during or following anesthesia. Other factors which may be considered are suppression of cough reflex and retention of secretions due to the irritation of ether

Further study of these cases was undertaken because of the frequency with which they were observed and because some of them were in correctly diagnosed.

#### REVIEW OF LITERATURE

A search of the literature revealed that little attention has been paid to aspiration pneumonia as a complication of anesthesia in obstetrics. Hall in 1940 called attention to aspiration pneumonits as an obstetric hazard by reporting 15 cases of aspiration pneumonia following delivery. His cases were of a serious nature since 5 died and several others required prolonged hospitalization. He commented that the aspiration of solid material into the trachea or bronchial tree might produce death from respiratory obstruction, while the aspiration of fluid material produced some

From the departments of Radiology and Obstetrics and Gyne cology. Cleveland City Hospital, School of Medicine. Western Reserve University. sort of chemical pneumonitis. He discussed a number of factors including diet prior to delivery position of the patient during ancethesia, and premedication which he thought might be related to the problem of aspiration of gastric contents. Autopsies were obtained in 2 of his 5 fatal cases. One showed both lungs full of a diffuse wet consolidation with air present only at the extreme apexes. The second was found to have both lungs col lapsed and the bronch of each lung filled with dark colored contents, apparently spinach or some other dark food.

Meurin in 1941 reported a senies of 7 deaths occurring in Essex County New Jersey in a period of 4 years, developing during or soon after labor and directly caused by the aspiration of stomach contents. He stated that in addition to these 7 cases, many other deaths had occurred which were probably also of this nature but which were not included in his report due to lack of accurricy of the available information or because of their controversial nature

#### SUMMARIES OF TYPICAL CASES

CASE 1 V M a white woman 22 years of age was admitted to the tuberculosis division of City Hospital on August 26 1944 Four days prior to her admission, following a labor of 15 hours duration she was delivered of a healthy infant at a maternity hospital elsewhere in the city. Ether anesthesia was administered for 40 minutes preceded by seconal medication and was followed by vomiting Evi dences of bronchopneumonia appeared and on the day following delivery she was transferred to a gen eral hospital At this hospital a roentgenogram of the chest made 2 days following admission showed irregular mottled and feathery shadows of increased density distributed symmetrically throughout all of both lung fields. Since the radiologist interpreted these changes as due to pulmonary tuberculosis, the patient was transferred to the tuberculosis division of City Hospital. On admission she was afebrile did not appear ill but presented scattered inspira tory musical rales bilaterally. The admission roent genogram of the chest, made 6 days following del ivery again showed diffuse bilateral mottled infil



Fig Case Fytensive patchy symmetrical bilateral bronchoppeumonia

tration less extensive than that observed on the submitted reenigenogram. Because of the symmetry, of her pulmonary disease the healthy appearance of the patient and the absence of pulmonary symptoms, pulmonary sarcodons was suspected. An othe roentgenogram of the chest made 10 days fol I wing admission showed the pulmonary infiltration thave undergone complet resolution. Since the rapidity of clearing of the inhiltration excluded both pulmonary tuberculosis and sarcoidosis it was evil



Fig. 3. Case 4. Dense bronchopneumonic infiltration in right upper and lower lung fields



Fig. 7 Case 3. Deme coalescent infiltration in white lower two-thirds of right bung field, and left hilless.

dent that the process represented a widespread brachoppeumonia. The patient was dischared as September 16 1044 to the care of a private physical

CASE 2 F N a colored woman 12 years of age, was admitted to the obstetrical service on March 13. 1044, in active labor Seconal was administered in dose totalling 3 grains as premedication. Delvor was effected following a labor of 31/2 hours duration Ether anesthesia was employed \omning of per ticulate and fluid gastric contents occurred durage and immediately following anesthesia. Dyspace and cyanosis developed. Bronchoscopic aspiration # immediately performed with rebel of dyspace, to lowed by the administration of sulfathiasole for a period of 3 days. The temperature rose to 15 degrees Centigrade for a period of I day after has it remained normal Scattered rales were promi throughout the chest. The total white count on the day following delivery was 12,800 white cells per cells millimeter A roentgenogram of the chert mack t day following delivery showed the presence of coales ce t poorly demarcated shadows of increased design distributed symmetrically throughout both fields interpreted as bronchopneumonia. Following the initial episode of obstructive dyapnes, the paties did not show evidence of senous illness. A second chest radiograph made 8 days following delact) showed complete resolution of the bronchoped monta. She was discharged April 3 1944, 11 days following her hosp tal admission.

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16

11

11

#### TABULAR SUMMARY OF 20 CASES

Extent of involvement
One lobe or less
One lobe to one lung
Excreding volume of one lung
Side involved
Right
Left
Bilateral

Localization in lung field Upper Lower

Midlung
Upper and lower
Involvement chiefly of right upper lobe
Density of infiltration

Slight Marked Type of anesthesia Ether cone

Oxygen ether Unknown Preliminary medication Barbina and accreteniae

Morphine and scopolamine
No sedative medication
Unknown
Time of last meal

Less than 6 hours before anesthesia Over 6 hours before anesthesia Unknown

Fever duration
No fever
Fever 1 day
Fever 2 to 3 days
Fever over 3 days
Unknown
Fever height

No fever 37 to 39 degrees Centigrade 39 to 41 degrees Centigrade Unknown

Unknown
Known to have vomited
Bronchoscopy performed
Chemotherapy
Administered
Not administered
Unknown

vomiting A roentgenogram of the chest made 3 days following delivery showed the presence of motiled and conglomerate shadows of increased density in volving the lower two-thirds of the right lung field and the left fillum area interpreted as broncho pneumonia. Despite the extent of the infiltration as observed roentgenologically the patient did not appear ill and her temperature did not exceed 38 2 degrees Centigrade. An x ray film of the chest made 4 days later showed the bronchopneumonia to have undergone complete resolution. She was discharged in good condition on April 4 1941.

CARE 4 E S a colored woman 19 years of age was admitted to the delivery room on February 12 1045 Delivery was effected under ether anesthesia preceded by atropine. The patient vomited shortly following delivery. Twelve hours later she developed

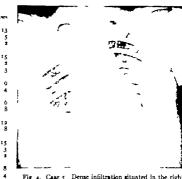


Fig 4. Case 5 Dense infiltration situated in the right upper lobe

a shaking chill and her temperature rose to §8.8 degrees Centigrade. A roentgenogram of the chest made on the day of delivery showed mottled shadows of increased density in the lower and medial portion of the right lung tield and in the left fillum area interpreted as bronchopneumonia. Sulfadazine therapy was begun. The patient remained febrile for only i day and recovered uneventfully. Another roentgenogram of the chest made 6 days following admission showed the pulmonary infiltration to have undergone complete resolution. She was discharged 8 days following admission.

CASE 5 B J a white woman 19 years of age was admitted to the obstetrical service on November of 1943 She was delivered under ether anesthesia pre ceded by morphine scopolamine medication follow ing a labor of 15 hours duration. After delivery she developed fever rising to a maximum of 38 4 degrees Centigrade A roentgenogram of the chest made 1 day following delivery showed a dense mottled infil tration in the upper lobe of the right lung interpreted as pulmonary tuberculosis. Although she did not present clinical evidence of serious illness she was treated with sulfathiazole for a period of 3 days. A second chest roentgenogram made o days following delivery showed the infiltration to have undergone complete resolution indicating that the original diagnosis of pulmonary tuberculosis was erroneous. She was discharged in good condition on November 21 1043

#### EVALUATION OF STUDY

Information concerning the 20 cases comprising this series is included in the accompanying tabular summary of the vessel markings has been found sug gestive of pulmonary hyperemia. None of the patients have shown mediasinal displacement or other evidence of massive stelectasis.

Clearing of the infiltration was rapid in most cases and complete in all. Fifteen of 18 cases in which serial films are available showed complete clearing in 1 week or less. The time of clearing in the other 3 cases is not known with certainty but complete disappearance of the infiltration was demonstrated on the eighth, ninth, and twenty first days, respectively

On strictly objective criteria, a roentgenologic diagnosis of aspiration pneumonia is not possible, but its recognition is usually easy if the roentgenologist has the clinical findings available to him, and if he is familiar with the condition. It may be confused chiefly with pulmonary tuberculous sarcoidous atelecta sis pulmonary edema, and other pneumonias. It is differentiated from both pulmonary tu berculosis and sarcoidosis by its rapidity of clearing as seen on serial films. It differs from lobar or massive atelectasis in its patchy character and in the absence of mediastinal displacement. Dependence must be placed upon the clinical findings to differentiate it from bronchopneumonias and pulmonary edemas of other etiology

It is evident that a roentgenogram of the chest made shortly following delivery may be a confusing diagnostic measure if its purpose is the detection of early pulmonary tubercu losis. Chest roentgenograms made for this purpose should be taken either prior to delivery or 2 weeks or more following delivery.

#### CLINICAL ASPECTS

The immediate sequel to vomiting during anesthesia has been respiratory distress. In 1 of the cases, this distress was sufficiently serious to require bronchoscopic aspiration for relief. In the remainder more simple measures proved adequate. There were no fatalities in this series, although the possibility of an immediately fatal issue is indicated by the reports of Hall and of Meurian.

The height of the fever manifested in these cases is indicated in the accompanying tabular summary. It was unusual for fever to be sus-

tained at a high level most of the patients presented one or several spikes of ferer with prompt fall either to normal or to a level below 38 degrees Centigrade. None presented the appearance of semous illness, and in none were clear-cut localized physical signs of consolitation, other than rakes, discovered. A sight leucocytosis, averaging 10,000 to 12,000 which cells per cubic millimeter was present in some

#### PATHOGENESIS

Two chief questions arise coocening the origin and nature of these bronchopneuments, namely what is the nature of the pathologic change in the lungs, and what is the explantion for the benign clinical course observed in

these patients?

It is generally recognized that, in addition to the classical forms of massive stelectus, smaller areas of lobular or paticly attection may occur as the result of occlusion of the bronchiolar radicles. It is probable that the shadows seen in the roentgenogram are a part due to such patches. Another factor contributing to the pulmonary changes in the raction of the lung tissues to the limiting particular contents, namely hyperemia, henoring-edemia, and exudation. Finally areas of laterial pneumonia may occasionally superview in areas in which virulent organisms have been appeared to the contents.

implanted. The failure of the cough reflex to expel the foreign material from the bronchial tree is probably in part due to the massiveness of the aspiration, and in part to the flindity of the aspirated material. Archibald and Brown have shown that cough, instead of expelling material from the bronchial tree, may actually cause at to be driven deeper into its rambotions. In their experiments upon animals, lodized oil was disseminated in the bronchal tree by cough, while thick tenacious sputum, being a heavier substance, was expelled. The dissemination of iodized oil by cough is a matter of common observation in broncho graphy On the basis of the experiments of Archibald and Brown, it is probable that gartric contents, because of their fluid nature and alight viscosity are widely disseminated in the bronchial tree by cough, and methiciently and incompletely expelled.

The benign course of these bronchopneu onias has been noteworthy One factor reconsible is their incidence in a group of young calthy women without evidence of cardiac or ulmonary disease A more important factor s the probable presence in these patients beause of their age of an adequate gastric acidity, inhibiting the growth of pathogenic

Other than coincidence (suggested by the bacteria. reported deaths in other series) the only fac tors known to have prevented immediate death from asphyxiation have been postural drainage of the bronchial tree, and its aspira tion by catheter suction in r instance bron choscopically for relief of respiratory distress.

### FACTORS PECULIAR TO OBSTETRICAL ANESTHESIA

A number of factors may play a part in the frequency of aspiration pneumonia in obstet ncal cases. First is the frequent necessity for administering an anesthetic when the pa tient's stomach is laden with food Second is the possible effect of premedication by barbi turate or by morphine in depressing protective reflexes or inducing vomiting Third the depth of anesthesia demanded in good obstet ncs is dangerously near the level at which vomiting may readily occur even when ex pertly administered Daily observation sug gests that the time of gastric evacuation is prolonged in labor and Meurlin states that

a delayed emptying time of the stomach during labor is a factor which should be kept in mind.' Finally vomiting is occasionally seen in the latter part of the first stage of labor and during the portion of the second stage of labor preceding anesthesia This may occur independently of medication and is probably of reflex origin.

# PREVENTION AND TREATMENT

The well known measures of postural drain age of the bronchial tree and its aspiration by catheter suction or bronchoscopically are the recognized methods of treating vomiting and aspiration during anesthesia.

The aspiration pneumonias in this series have not been of sufficient clinical seventy to require the use of chemotherapy nor did

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chemotherapy affect the course of those pa tients in which it was used

The administration of an emetic in early labor to the woman who has recently eaten solid food has been practiced in this community Gastric evacuation by induced emesis, when carefully executed, might prevent the

postanesthesia vomiting and aspiration of The properly trained anesthetist will be particulate matter

able in most instances to maintain his patient in the narrow zone of anesthesia in which the labor processes are allowed to continue with out the development of vomiting

## SUMMARY AND CONCLUSIONS

1 A series of 20 cases of bronchopneumonia was observed at Cleveland City Hospital which developed following obstetrical delivery in which ether inhalation anesthesia was used

2 Their chief cause was the aspiration of gastric contents as a result of vomiting The possible contributory role of the following factors was discussed (1) preanesthetic med ication favoring suppression of the cough reflex, (2) prolonged gastric evacuation in labor (3) fluidity of gastric contents favoring their dissemination in the bronchial tree

3 The bronchopneumonias varied in extent from small isolated patches to extensive bi lateral infiltrations. They were observed in all portions of the lung fields.

4 Chincally they did not prove a cause of serious illness and no fatalities resulted Chemotherapy by sulfonamide drugs was

5 Roentgenologically the problem was one apparently not effective of differential diagnosis, requiring differentia tion from pulmonary tuberculosis, sarcoidosis other pneumonias pulmonary edema and atelectasis

### REFERENCES

- I. APPELDACE, C. W and CHRISTIANSON O O J Am M Ass., 1937 108 503-3 ARCHBAID, E., and BROWN A. L. Arch. Surg 1928,
- 5 FETTERMAR, G. H., and MORAR, T. J. Pennsylvania M. J., 1942, 48. H. Hali, C. C. J. Am. M. Ass., 1940, 114, 148. H. Hali, C. C. J. Am. M. Ass., 1940, 114, 148. H. Hali, C. J. Am. M. Ass., 1940, 114, 148.

  - 5 HAURE, E. D. BOM GARAGEMAN, C. V. J. CH. S. C. KARSERS, H. T. B. Human Pathology 6th ed. Philadel phia: 1943. T. B. Human Pathology 6th ed. Philadel phia: 1943. T. B. Human Pathology 6th ed. Philadel phia: 1943. J. B. Human Pathology 6th ed. Philadel phia: 1943. J. S. C. N. Jersey 1941. 38 369.

## THE RETROGRADE LYMPHATIC SPREAD OF CARCINOMA OF THE "RECTOSIGMOID REGION

### Its Influence on Surgical Procedures

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TEW organs of the body have been subi tected to more intensive and exhaustive study in recent years than has the rectum This is particularly true with reference to carcinoma and its notentialities in this reman. Needless to say we are still for removed from an understanding either of its cause or of its specific cure although admit tedly great strides have been made especially with regard to its surgical treatment. Those advances that have been made are based on a more thorough understanding of the nature of cancer of the rectum including the form which it is likely to assume its rapidity of growth, its mode of spread and its final out come. Here as elsewhere it has been learned that malignant disease with perhaps some few exceptions, can be adequately controlled only by complete externation, hence the innumerable surgical methods and modifications that have come into practice.

Movnihan in 1008 made the significant statement that the surgery of malignant disease is not the surgery of organs it is the anatomy of the lymphatic system Nowhere is this more applicable than to malignant disease of the rectum. It is toward the anatomy of the lymphatic system that the greater por tion of this study has been directed. Many investigators in the past and present have de voted much of their time to its study and the results of their work as well as the conclusions of this research will be correlated in an at tempt to determine what an adequate method of treatment for carcinoma of the rectum and particularly of the rectosigmoid region implies.

From the Mayo Foundation and the Division of Surgery Mayo Chalc.

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Abridgment of thesis submitted in September 944, by Dr Glover and accepted in November, 1944, by the Faculty of the Graduate School of the University of Minnesota in partial fulfilment of the requirements for the degree of M.S. in Surgery.

If as has been the dream of surreous for many years, cancer of the rectoslement and upper part of the rectum with its involved diseased region can be removed, with restoration of normal continuity to the bowel and preser vation of sphincteric control, a great contribution will have been made. It was with meh an aim in more that this study was more taken for should it be feasible from a pathologic standpoint an impetus for refinements in survical attack and technique will surely fol low: As carcinoma of the rectum represents some a per cent of all cancers (1 15) # is evident that the number of patients who might be concerned is considerable and any pathologically sound attempt to avoid the construction of an artificial anus will be well repaid. Such attempts have been numerous and with good, result when properly carried out but have been frowned on by many who believe them to be more semational than radical, basing their belief primarily on the work of Miles.

### SPREAD OF CARCINOMA

Malignant disease may spread primarily in one of three ways by local extension from its site of origin by invasion of venous channels, and through the lymphatic system. An evaluation of any therapeutic approach to cardnoma in a given region must therefore take into its scope each of these avenues. Although an extensive literature concerning the first two of these modes of spread exists, the ongnal work of this paper deals only with certain aspects of lymphatic spread and consequently discussion other than of the lymphatics must necessarily be limited to a few short statements.

Local extension Carcinomas of the recto argmoid are relatively slow-growing malginal lesions. Microscopically three quarters of

them are of low grade, so that one would ex pect considerable local growth before any widespread metastasis has occurred. W J Mayo (25) emphasized this point in 1910 and resterated it repeatedly (26 27) as have other writers (4 33) Indeed, in his experience local extension more than any other factor, including lymphatic and hepatic involvement, was the common cause of inoperability That distant metastasis may occur while the mass of the disease remains localized is of course well recognized and indisputable but by and large it may be stated that a considerable period elapses in most cases before this occurs It is obvious therefore, that all locally in volved tissues must be removed at the time of operation and to accomplish this end it is absolutely essential that wide excision through healthy tissues be practiced

Venous spread Once carcinoma has spread into venous channels with the formation of malignant thrombi and dispersion of malig nant emboli, no surgical procedure however radical can be devised to rid the patient of his affliction. Were such a sequence of events customary the prognosis for cancer of the rectum would indeed be grave Fortunately this does not obtain although investigations within the last decade tend to show that it is a more frequent occurrence than was formerly suspected

Intravascular invasion seems remarkably constant, occurring in approximately a fifth of all cases of malignant lesion of the lower part of the colon (8 13 34) As would be ex pected, the higher the grade of malignancy the higher becomes the incidence of venous involvement and the greater the probability of visceral metastasis (3)

Perhaps the most significant observation concerning venous spread was made by Clogg in 1904 He noted that when dissemination via the blood stream occurred it frequently did so before the disease had spread to lymph nodes. Recent studies (13) have confirmed this impression and enlarged on it to show that most vascular invasion originates within the involved intestinal wall itself or within the immediately adjacent perirectal tissues and not from more distant extensions. Consequently although sharply limited and seemingly favorable for surgical removal, a rather innocuous-appearing cancer may prove as deadly as the most widespread and perforat ing types. Such cases explain why the rate of cure declines in direct proportion to the degree of penetration even though no involvement of perirectal fat or lymphatic network be found It must be obvious therefore that the threat of venous spread demands early rather than radical surgical intervention the latter being directed more especially against local and lymphatic expansion

Lymphatic spread As carcinoma spreads through the ramifications of the lymphatics in a most systematic and relentless manner, the problem of its control must be met with equal thoroughness and determination. To do so en tails an intimate knowledge of all pathways over which such an advance may occur. The literature contains several detailed and exact studies (9 32 35) to which reference may be made with considerable profit and from them Figure 1 has been constructed.

Anatomic review Considering the anus and rectum as one continuous tube at may be divided into three regions corresponding roughly to the areas supplied by the inferior. middle and superior hemorrhoidal arteries. The inferior region is the 25 centimeters of anus proper terminating superiorly at the pectinate line The middle region extends upward from the pectinate line to a point just above the insertions of the levator and muscle The superior region extends from this point to the sigmoid colon and terminates approximately at the level of the third sacral verte bra. This latter is the largest of the three regions.

The lymphatics in all of these regions origi nate in a rich network of tiny lymph spaces the extremely close meshes of which extend throughout the mucosal, submucosal and intermuscular layers Although continuous diversified connections of this network have been said to exist between all three regions for the most part they may be found to unite into their own collecting trunks, which further join to terminate in lymph nodes after the full thickness of the intestinal wall has been traversed. Thus the direction of flow is essentially at right angles to the long axis of the bowel.

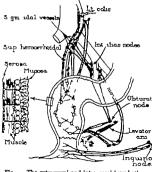


Fig The extramural and latramural lymphatic systems of the rectum (intramural system after Leitch)

even though many small intermediary branches may course in any direction en route to their final destination. In other words lymph potentially able to spread from anus to sigmoid in whole or part via these small channels never does so a point which will be discussed in some detail presently under intramural spread. Having thus arrived in the collecting trunks drainage proceeds according to definite pattern.

1 Inferior and middle regions. Although drainage from the inferior and middle regions is not strictly a concern of this work, it may be pointed out in passing that most if not all of the lymph originating in the region at the same level as, or immediately above, the in sertions of the levator ani flows upward, joining the pathways of the superior region. Some may however spread laterally along the levator muscles, either superior or inferior to them and some may also spread caudally through the adipose tissue of the ischiorectal fossa. Thus the lymphatic pattern of the middle region might possibly in certain instances be designated as being 'perincopelviabdominal (Fig 1)

2 Superior region. \umerous efferent trunks pass through the muscular coat at

different levels. Most frequently these trunks become satellites of the branches of the sme rior hemorrholdal vessels, usually two for each artery After perforating the rectum they me obliquely unward and backward to reach the nodes in the mesorectum. In their perirectal course they traverse several small nodes placed on the muscular layer and covered by the serous coat of the rectum (nararectal nodes of Gerota) These nodes are found expectally in the region of the ampulla, the lowest immediately above the levator ani. The amenor nodes however may be found projecting underneath the serous coat and are minute The true mesarectal nodes of considerable are are usually grouped around the smeror hemorthoidal artery and may be regarded as the true regional nodes of the superior region of the rectum. The flow of lymph in these channels is unward, although it is concervable that a dam or block to the natural moward course might cause lymph to flow in a retrograde manner Normally however the lymphatic drainage of the superior region of the rectum is only abdominal in direction (35) a point which cannot be too strongly emphasized Whereas dramage from the inferior and middle regions of the rectum may be perincopelyabdominal with anastomoses in the posterior part of the vagina and the levator an muscles, drainage from the upper part of the rectum has no direct anastomosis with pelvic organs unless it be by long tedious and unnatural retrograde flow down the surface of the rectum in the face of complete unward blockage as suggested previously

Pathologic consideration. Having this become well versed in the normal course of lymphatic drainage in and from the rectum it is now possible to appreciate more fully by mailignant processes avail themselves of these channels. Discussion will be greatly facilitate by dividing the lymphatic system as a who into intramural (from mucosa to scross) and extramural (from serosa to regional nodes) components.

I Intramural (Fig I) Carcinoms of the rectum takes its origin from altered mucosi cells of the rectal hung usually stated as unique deep in the crypts of Leberkuchn. From this tiny focus it may apread either by direct

extension and invasion of small lymph meshes from its margins or directly through the thick ness of the rectal wall Marginal extension is greater and more rapid transversely around the bowel than through the rectal wall but even transverse extension is extremely slow 6 months being the estimated time for carcinoma to travel approximately a quarter of the way around the lumen Advance through the submucosal and muscular layers is equally slow and the scrosal covering has usually not been reached until the growth has traversed three quarters of the circumference of the bowel or until some 18 months have elapsed The circular and longitudinal muscles are pierced by radial channels thus giving free communication for malignant cells to travel between submucosal intermuscular and subserosal plexuses.

Cole was able to show that whereas carci noma spread more widely in the submucosa han on the mucosal surface and still more videly in the muscularis there was no evi dence of longitudinal permeation of the intestinal wall beyond the microscopic edge of the growth. Other studies appearing at approxi mately the same time all substantiated this view (5 22 30) Monsarrat and Williams demonstrated that as a rule longitudinal spread occurs only to the distance of about 2 centimeters above or below the gross mucosal edge of the lesion and that this invasion is greatest in the subserosal portion In more recent years ample evidence (12 20 21 24 20) has accumulated indicating the improba bility of any widespread dissemination along the course of intestinal walls comparable to the spread along the wall of the stomach that may occur in cases of gastric carcinoma. Apparently described anastomotic channels to any great distance are potential rather than actual. Leitch has expressed the belief that the lymphatics of the mucosa do not exist as a continuous plexus but are arranged in a decussating arborescent pattern from the collect ing stems which pierce the circular muscular coat. Spread in the intermuscular lymphatics is just as limited (Fig 1) It may therefore be stated that intramural dispersion alines it self closely with observed gross and microscopic extensions of the growth and plays no

part in the demand for extensive radical sur gical intervention

2 Extramural. By far the most important mode of extension extramural spread has accordingly been the subject of most well di rected research to date Because of its sup posedly widespread potentialities carcinoma at the rectosigmoid juncture has for the most part been subjected to the same treatment as has carcinoma lower in the rectum with re moval of perianal skin rectal sphincter and the whole pelvic colon Evidence in the litera ture combined with that of this study will demonstrate rather conclusively however that many growths high in the rectum lend themselves admirably to procedures far less radical than this and more acceptable to the patient but equally effective as far as the disease process is concerned. Close scrutiny and attention to detail will reveal a loophole which up to the present although noted by several investigators has failed to become widely rec ognized as such True it is that a few surgeons have explored these possibilities to their own satisfaction but the majority either are un aware of the opportunities afforded or have been misled by existing pathologic studies

In accord with anatomic findings Miles observed that malignant processes might extend in an upward lateral or downward direction although in his study he made no attempt to give the exact location of the lesions employ ing these various pathways The common course is upward for it occurs in every case regardless of the site of the lesion from anus to sigmoid

Lateral dissemination refers to that which courses along the levator an muscles, the coccygei base of bladder cervix or base of the broad ligaments to terminate in the internal iliac nodes Miles has encountered such in volvement in several cases both in that por tion of the levators immediately adjacent to the bowel and far laterally near the pelvic walls. Gilchrist and David made similar observations in 4 cases of their series Coller Kay and MacIntyre in 6 and Gordon Watson and Dukes (18) in 1 case That lateral dissem mation may occur therefore is unquestioned and when one is dealing with low lying growths it must be given due consideration

TABLE L-INCIDENCE OF RETROGRADE NODAL METASTASIS IN CARCINOMA OF RECTUM AND RECTOSIGNOID REVIEW OF LITERATURE

	Total	Positive notice—cases	Modes favolved below letter—cases	Detaice below	The of lange
McVay 1900	100	47		o-	America
Wood and Wilkin, 933	190	ı			<del> </del>
Westhese, 934	74	,			1,
Oabriel, Dukes and Ressey 235	100	•		0-1	Upper rectam (8 and 9 cm )*
Glickrist and David, 938	1	•			America
Coller Kay and Maclatyre, 940	33	11		5	Rectaniquesia
Orianell, 943	75	41	í		Ampulla (6 cm )*
Total of cases in the literature	807	<b>191</b>	1		
Glover and Waugh, \$44			n	<b>~</b>	Upper rectors, rectorigrands and lower negation
	1		6	1-0	
	1	ì		<b>₽</b> -3	1
				3-4	1
	1			6-7	1
Potal of Glover and Wangh's data	100		14		· · · · · · · · · · · · · · · · · · ·

Above the pertinate line

Downward invasion, as Miles used the term refers to soread along the inferior hemorrhoidal vessels through ischiorectal fat and Alcock s canal, eventually to internal iliac nodes. Miles discussed a specimen removed by abdominoperineal resection in which the cancerous process had taken such a course Other evidence that he presented was derived from records of postoperative recurrent growths occurring in the posterior wound. Whether these growths may be regarded as of true lymphatic origin or as occurring by direct invasion is a matter for debate Gordon Watson and Dukes were undecided as spread in 2 of the 3 cases in which they noted ischiorectal involvement appeared more likely to be by direct continuity

The long unbroken chain of lymph nodes originating in the small pararectal nodes of Gerota deeply placed in the pelvis posterior to the rectum and extending through the larger superior hemorrholdal group on into periaortic channels constitutes the upward and primary lymphatic drainage of the rectum Neoplastic lesions situated anywhere within the pelvic colon sooner or later advance over this well traveled route. In the upper part of the rectum it is the only lymphatic drainage for malignantily lymphatic drainage aroilable for malignantil invasion.

unless, on further investigation, ideas concerning the importance of recently described perineural or perivascular (34) networks are

confirmed. This unward spread proceeds in an orderly manner so that on specimens from cases of advanced carcinoma there is a sequence of involved nodes stretching from the primary growth to the point of ligature of the inferior mesenteric vessels. This procession is usually from node to node but occasionally it is discontinuous with considerable intervening gaps, due to the presence of several upward tracks running so to speak over the same roadhed. Numerous paths course directly to nodes at the bifurcation of the superior hemor rhoidal vessels, a few to the junction of the superior hemorrhoidal and lowest algoridal vessels, by passing all nodes en route and others to the junction of the left colic and inferior mesenteric vessels. Thus on occasion, intervening uninvolved nodes have been observed, so that it is impossible to state which node is the highest seat of metastasis unless all to a considerable height have been examined. Examples of this pattern have been shown by Grinnell Gabriel, Dukes, and Bussey (14) Wood and Wilkie as well as many others.

As no anastomoses of the lymphatics of the upper part of the rectum with those of pelvic organs exist, no lateral spread of carcinoma of the upper part of the rectum as described previously can occur via the lymphatics. In vasion by direct continuity may and does of course take place in direct proportion to the age of the growth.

Downward or retrograde spread along the course of the bowel through pararectal nodes although normally nonexistent may under certain circumstances be observed. In cases of advanced carcinoma in all probability beyoud the realm of surgical cure when the superior hemorrhoidal and inferior mesenteric nodes all or in great proportion become clogged with extensive metastasis cancerous cells may take the course of least resistance downward in this instance over the same pathways which normally carry only one-way traffic-upward (17) Examples of this in the literature are rare and may be seen in Table I. There it will be noted that only 8 such cases have been observed the node at a centimeters below the lesion (Gilchrist and David) probably being the only true demonstration of such retrograde flow. If therefore retrograde metastasis is so rare and there are no other lymphatic anastomoses between the upper part of the rectum and pelvic structures should it not be reasonable that such facts be more widely applied in the surgical attack on lesions of the upper part of the rectum and rectosigmoid region? In order to be certain that such a stand could be taken on factual pathologic evidence and in the feeling that examination of the portion of the rectum and perirectal tissues lying between the lower part of the sigmoid and the insertion of the levator an muscles would give the crucial answer long and tedious study was directed at this region by means of the following procedures.

### MATERIALS AND METHODS

One hundred surgically removed rectums containing adenocarcinoma of the upper part of the rectum the rectosigmoid or the lower part of the sigmoid were obtained from the Division of Surgical Pathology of the Mayo Clinic An attempt was made to secure only those specimens which represented far ad

TABLE II — RETROGRADE LYMPHATIC SPREAD
IN 100 CASES OF CARCINOMA OF THE
RECTOSIGNOID BY GRADES (BRODERS)

Microscopic grade	Total cases	Nodal lavolvement below lexico-cm					
		·-		2-3	3-4	6-7	
	5	- 6		_		-	
	48	- 1	_			_	
1	7	•		-			
			4	_		_	
Total		,	6				

\*See report of Case 7

vanced disease so that the greatest possible spread of neoplastic cells might be contained therein A choice from 2 206 such specimens was made only those removed by combined abdominoperineal technique being used to be assured of the maximum tissue for dissection

That these specimens constituted a group containing most extensive malignant lesions is evidenced in several ways. All of the adenocarcinomas were of Duke s type C (11) that is all had metastasized to adjacent and regional lymph nodes Grossly oo were ulcera tive and I was polynoid. Ulcerative lesions of the colon are the most malignant and invasive type. Twenty nine had advanced to perforation Eighty three of the ulcerative lesions were annular. As to their site of origin in the upper part of the rectum and above o 5 centimeters was the average distance from the lower gross mucosal edge of the lesion to the anorectal or pectinate line. This fact was ascertained by measurements of the formalin ized specimens as well as by those recorded on the pathologist's report made at the time of operation and further corroborated by proctoscopic examination before operation,

It was originally intended to select the cases in equal number from each of the four grades of malignancy as classified by Broders thus making comparison of results more uniform than it would be otherwise. However as 75 per cent of rectal lesions are of low grade (1 and 2) it was impossible to secure enough specimens of the higher grades (3 and 4) which had not previously been used for other studies to fill in the required quota. Rather than sacrifice accuracy for statistics, all those lesions of higher grade which fulfilled the pre-



For Case Location of the curcinoma with reference to the bowel, lymphatic and vascular systems (care-norms, shaded area involved nodes, black dots uninvolved nodes, open dots)

viously stated requirements were chosen first -27 in number-and the difference up to 100 -73 cases-was obtained from the more plentiful exercisors of low grade (Table II)

Two methods for the complete examination of the lymphatic region of an organ are available. The injection method the one most recently used and especially adapted to the examination of fresh tissues, is that described by Spalteholtz and modified by Gilchrist and David. This type of investigation is accurate and has enabled its advocates to find many more nodes than they were previously able to locate by gross dissection of fresh specimens.

The other method is the more time-con suming and laborous gross dissection. This is the only method which can be used for tissues long immersed in formalin and may with application produce as satisfactory results as the injection method. Suffice it to say that the dissection method yielded results quite comparable to any other for in those 5 cases of this series in which all the nodes on the entire specimen were examined an average of 60 nodes per specimen was found, the largest number being 82 the smallest 44.

By gross dissection then each of the too specimens was minutely examined from the lower gross mucosal edge of the lesions present to the anna Serial sections were cut each annroximately i centimeter in width the incisions beginning in the perirectal fat and being carried into the mucosa. The numerous slices thus produced were allowed to remain hinged on the miscosa so that accurate meaurements could be taken concurrently all lymph nodes were removed and each was carefully labeled not only as to its relationship to the lesion itself but also as to its postion on the vascular tree. From these data all nodes were charted on disprenimatic sketches of the pelvic colon which were drawn to scale and on which each lesion had previously been outlined also according to scale. An average of II nodes per specimen was found between the lumits outlined previously the largest number being 53 the smallest 2 A total of 1.330 nodes was found during the course of the whole study including nodes examined behind and above the lesions in the few cases indi-

cated later

Each node was then subjected to microscopic examination by the frozen section
technique used in this case for screening those
nodes metastatically involved from those uninvolved All nodes containing any evidence
of cancerous cells were further sectioned and
stained with hematoxylin and cessin for study.
Those found to be free from involvement were
not examined further. One thousand four
hundred seventy nine sections were made.

### RESULTS OF STUDY

In 64 cases there was no spread dutal to the lower gross mucosal level of the lesion but in 36 cases there was dutal spread. In 27 of the 36 cases the nodal involvement was within the first centimeter and no lower in 6 it was between 1 and 2 centimeters but no lower and in 1 case each it was between 2 and 3 centimeters 3 and 4 centimeters, and 6 and 7 centimeters.

All those cases in which there were positive nodes from the lesion to 2 centimeters but so lower were considered to be of no particular significance for the reason given previously in the section on intramural spread. It will be

remembered that as malignant invasion proceeds from the mucosal to the serosal surface of the intestinal wall it does so in a more or less triangular fashion the base of the triangle being placed longitudinally along the long avis of the howel in the perirectal fat at the serosa. In advanced lesions such as these the greater involvement in the perirectal fat and serosa as compared with involved mucosa al ways extended 1 centimeter below and above the longitudinal diameter of the lesion as measured on the mucosa frequently extended to 2 centimeters in either direction and was occasionally seen at 3 centimeters. As a consequence all nodes within the first centimeter were found to be imbedded in carcinomatous tissue so that their removal for microscopic examination was in reality of academic interest only Four of the 6 cases in which lym phatic spread was 1 to 2 centimeters were in this same category. In the other 2 cases the involved nodes were immediately adjacent to but not actually imbedded in carcinomatous tissue. The nodes from the a cases in which nodal involvement was more distal however were further removed from directly involved tissues although malignant extensions from the local growth were considerably closer than the indicated distance as measured from the lower mucosal level of the lesion In summary therefore, of the 100 cases in which the tissues were thoroughly examined only 3 could be classified as exemplifying true retrograde metastasis of any significance

The obvious question now arises. Why did retrograde lymphatic permeation occur in 3 cases and not in the others? This problem en tailed the re-examination of those tissues in which retrograde spread had occurred For the sake of obtaining more complete evidence and also because 2 of the 6 cases with spread to 2 centimeters might be construed as in stances of downward spread all cases in which the distance was more than I centimeter were included in this additional study In the same manner as has already been de scribed all remaining nodes on the o specimens in question except as indicated were removed and subjected to sectioning and charting A detailed report was prepared for each case consisting of both clinical and



Fig 3 Case 2 For explanation see legend of Figure 2

pathologic features as they applied in each instance

### REPORT OF CASES

CASE 1 A white woman, 61 years of age registered at the Mayo Clinic July 14, 1917 with a chief complaint of rectal stoppage A detailed history revealed I year of rectal bleeding suprapubic un easiness ribbon like stools and finally almost complete obstruction and loss of 20 pounds (13 2 kgm) Physical examination gave negative results except for a large hard fixed encircling mass high in the rectum On July 23 1917 one stage perineoabdom inal resection was performed. During the operation a small suspicious nodule was felt in the liver. The patient was dismissed from the clinic on August 31 1017 after an uncomplicated recovery. The last report indicated her death in November 1917. No details were given. Grossly the surgical specimen contained a very extensive annular ulcerative le sion 7 by 6 by 4 centimeters mucosal measurement 6 centimeters above the pectinate line A total of 70 lymph nodes were found Microscopically the lesion was an adenocarcinoma grade 4 (Broders) For distribution and involvement of nodes see Figure 2 The lowest involved node was found between 1 and 2 centimeters below the lower mucosal edge of the lesion.

CASE 2 A white man, 36 years of age regustered at the clinic April 25 1034 with a chief complaint of constipation after 6 months of blood-streaked, nucoid rectal discharges dull abdominal aches and pains increasing constipation and loss of 7 pounds (3 2 kgm.) Physical examination gave casentually



Fig. 4. Case 3. A cross section through the perirectal insecs at about the midportion of the lesion as ulmstrated i. Figure 5. The solid carrinomatous area on the left corresponds to the double crosshatched area. I. Figure 5. The two nodes to the right above are also represented in Figure 5. They were found to be completely replaced with cancer cells. The block to the upward flow of lymph is obvious.

negative results except for a large encircling lesion especially prominent on the posterior wall high in the rectum This lesion was venfied by proctoscopic examination. On May 1 1934 one stage combined abdommopermeal resection was performed. At operation the liver was noted as clear. The patient was dismissed from the clinic on May 24 1934, after an uncomplicated recovery. The last report indicated death in December 1935 with extensive metastasis about the colonic stoma abdomen and liver Grossly the surrical specimen contained a huge ulcerative lesson 15 centimeters in diameter mucosal measurement to centimeters above the pectinate line A total of 55 nodes were found Microscopically the lesson was a colloid adenocarcinoma grade 4 Fo destribution and involvement of (Broders) nodes see Figure 3 The lowest involved node was found between and 2 centimeters below the lower mucosal edge of the lesion

AR 3 A white man 50 years of age registered at the clinc July 23, 1936 with a chief complaint of "bloody diarrhea." For 1 year he had had bloody rectal discharge and dull abdominal cramps with a final weeks of constant pans and constipation. He had lost 40 pounds (18 1 kgm) Physical examination revealed a huge hard irregular cauliflow if like mass in the rectum which was vended by proctosopic examination On July 27 and August 24, 396 two stage combined abdominoper lacel resection was per formed. The liver was clear but there was extensive apread to the bladder and around the left ureter. The nation left the clinc in September 23, 1936.



Fig. 5 Case 3. For explanation see legend of Figure Compare with Figure 4

without damessal but recovery had been uncompocated. The last report indicated death in April, 1015 but no details were given. Grossly the suppellayer imen contained an extensive an internative leason o by 8 by 5 centimeters, master incomments of the one of the suppellayer in the contract of the contractive ment 6 centimeters above the pectual necessary to two nodes only were removed and examined the others were allowed to remain as risk for photographic evidence as shown in Figure 4. Microsoically the leanon was arrowed in the properties of the Ford distribution and involvement of nodes see Faure 5. The lowest involved node was found between 2 and 3 centimeters below the lower mucosal eder

of the lesion CASE 4 A white woman 3 years of age regis tered at the clinic August 22 1938 with a chef complaint of duarrhea. For 3 months she had had colicky pams in the left lower quadrant associated with diarrhea, occasionally bloody She had lost 13 pounds (5 9 kgm ) Physical examination gave och tive results except for a mass with some fixation of the bowel on rectal examination. Proctoscopic ally a lesson was found involving the right and asterior walls of the lower part of the sigmoid colon. On August 29 and October 3 1938 two stage combined abdominoperineal resection was performed. The liver was noted as clear but there were impliant throughout the pelvic pentoneum. The patient dismissed from the clinic November 19 1938, in good condition after a mild postoperative armany infection. The last report indicated death on April 7 1941 from a recurrence. Grossly the sargest



Fig. 6 Case 4. For explanation see legend of Figure 2

specimen contained a perforated annular ulcerative lesion a by 3 by 3 entimeters mucosal measurement 16 centimeters above the pectinate line. A total of 83 nodes were found Alicroscopically the lesion was an adenocarcinoma grade 3 (Broden) For distribution and involvement of nodes see Figure 6 The lowest involved node was found between 6 and 7 centimeters below the lower mucosal edge of the lesion

The question arises in this particular case whether all the involved nodes shown below the lesson in Figure 6 represent true retrograde spread. As the lesion itself was in the lower part of the sigmoid a portion of the colon still maintaining a mesentery it seems probable that normal flow of lymph had occurred over the two lower rectosigmoid arcades both of which he below the lesion. This is consistent with the lymphatic drainage of the colon proper which differs from rectal drainage in that it may proceed along the axis of the bowel in either direction from a lesion until a vascular arcade has been reached at which point it courses in through the mesentery to large midline plexuses of nodes. In that event only the four lower carcinomatous nodes a span of about 3 centimeters would represent true retrograde involvement. However as



Fig. 7 Case 5 For explanation see legend of Figure 2 Compare with Figure 8

the original premise and conditions of study included all nodes below the level of the lesion all the nodes in Figure 6 will be considered as examples of retrograde spread

CASE 5 A white woman, 57 years of age registered at the clinic November 13 1939, with a chief complaint of increasing constipation of 8 months duration bloody stools and the continual sensation of a full rectum She had lost 17 pounds (7 ½gm) Physical examination gave negative results except for a large rectal mass which was confirmed by proctoscopic examination. On November 17 1039 and January 19 1940 two stage combined abdomin



Fig. 8. Case 5. Lesion from serosal surface. Because of the absolutely solid nature of the infiltrating carcinoma in the perirectal fath was deemed unnecessary to attempt dissection of the nodes behind and above the lesion in this

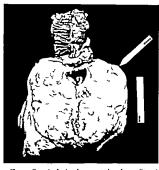


Fig. c. Case 6 Lesion from serosal surface split and laid open, showing the solid nature of the infiltrating cancer (see report of Case 6)

openneal resection was performed. The liver was noted as clear. The patient was dismused from the clinic March 18 1040 in good condition after a complicating postoperative thrombophlebits. The last report indicated death on April 12 1041 from a recurrence. Grossly the surgical specimen contained a large annular ulcerative lesion 7 by 6 by 5 centimeters mucosal measurement o centimeters above the pectinate line with two polyps one 5 centimeters below the growth and one I centimeter above it Twenty seven nodes only were removed and examined the others were allowed to remain in silv for photographic evidence as shown in Figure 8 Microscopically the lesion was a colloid adenocarci noma grade 2 (Broders) For distribution and invol rement of nodes see Figure 7 The lowest involved node was found 3 to 4 centimeters below the lower mucosal edge of the lesion.

Care 6 white man, 32 years of age registered at the cline December 2 1940 with a chief complaint of weight loss. For 3 months he had had rectal bleed go irrgence and bouts of diarrhea and constipation. He had lost 17 pounds (77 kgm.) Physical examination revealed a "mass felt high in the rectum which was confirmed by proctocopic examination. On December 7 1940 one stage combined abdominoperineal resection was performed. The liver was clear to palpation. The patient was duminsted from the clinic January 2 1941 in good condition. The last report on June 18 194 stated that he suffered from backache and pain down both legs. There has been no further communication. Grossly the surgical specimen contained an ulcerative lession 5 by 4 centumeters with direct extension.

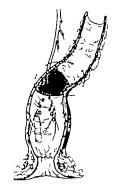


Fig. Case 6. For explanation see legend of Figure Compare with Figure 9

into perirectal tissues forming a mass 8 by 6 centmeters. The lesson was 8 centimeters above the pectinate I ne Only 9 nodes were removed and er arnined the others being allowed to remain is ris for photographic evidence as shown in Figure 9 Because of the absolutely solid nature of the infitrating cancer throughout all penrectal torses behind and above the lesson it was not considered necessary to isolate nodes in order to demonstrate their blocked nature Figure o demonstrates adequately the large dam-like mass extending around the bowel and effectively shunting advancing cardnoma in a retrograde direction. Microscopically the lesion was an adenocarcinoma, grade 3 (Broden) For distribution and involvement of nodes see Figure 10 The lowest involved node was found 1 to a centimeters below the lower mucosal edge of the leuon

CARE 7 A white woman 52 years of age, reptered at the chind June 6 1911 with a chief conplaint 1 bloody diarrhes." of 5 months with agic
of low backache She had not last weight. Physical
examination demonstrated a large, nother mans
the left posterior wall of the rectum which was onfirmed by proctoscopic examination. On June 10
and August 8 1911 two stage combined absentionperinced resection was performed. On September,
1911 the patient was dismissed in good credition
after complicating thrombophicibits, juniously
embolism and procursonia between stages of the resection. September 10, 912 a plastic operation sta

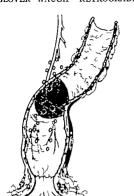


Fig. 1 Case 7 For explanation see legend of Figure 2 Compare with Figure 12. The small black rectangle is discussed in the report of Case  $\gamma$ 

1942 to April 1943 four courses of roentgen therapy were given. The last report on September 23 1943 showed the presence of some pelvic pain Grossly the surgical specimen contained an annular ulcera tive perforating lesion 5 by 4 by 15 centimeters, mucosal measurement 8 centimeters above the pectinate line. A total of 23 nodes were found. The small black rectangle shown on Figure 11 between 1 and 2 centimeters below the growth represents tissue removed under the impression that it was a lymph node. Careful microscopic examination in dicated that very little lymphoid tussue could be identified. There was however a small blood vessel with a small region of carcinomatous cells imme diately adjacent, which may have represented a tiny node completely replaced by cancer or may have been a rare demonstration of perivascular spread (Fig 12) In any event it was impossible to show adequate evidence of a block above this lesion as only 4 of the 14 nodes behind and above the lesion were involved. Microscopically the lesson was an adenocarcinoma grade i (Broders) For distribu tion and involvement of nodes see Figure 11 No involved nodes were found below the lower mucosal edge of the lesson.

CARE 8 A white man 62 years of age registered at the clinic September 8 1041 with a chief complaint of "alternate constipation and diarrhea. One year of constipation rectal bleeding parmidi move ments and a loss of 12 pounds (5.4 kgm ) were the main symptoms. Physical examination disclosed a high facel lesion in the rectum which was verified.

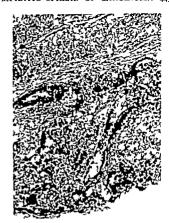
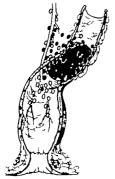


Fig 12 Case 7 Possible perivascular lymphatic spread as discussed in report of Case 7. The vessel is cut longitudinally the lumen appearing as a strand of cells in the upper right corner ×100

by proctoscopic examination. On September 25 and October 27 1041 two stage combined abdominopermeal resection was performed. The liver was clear The patient was dismissed on December 4 1941 in good condition despite a mild urmary in fection (postoperative) The last report on July 16 1043 indicated a loss of 15 pounds (6.8 kgm ) but no other evidence of recurrence Grossly the surgical specimen contained an annular ulcerative perforat ing lesion 7 by 6 centimeters mucosal measurement 12 centimeters above the pectinate line. A total of 56 nodes were found Microscopically the lesion was an adenocarcinoma grade 4 (Broders) For distributton and involvement of notles see Figure 13. The lowest involved node was found between 1 and 2 centimeters below the lower mucosal edge of the lesion.

CASE 9 A white woman 39 years of age registered at the clinic September 17 1942 with a chief complaint of constipation. For 2 years she had had recurrent rectal bleeding pain high in the rectum and increasing constipation. She had lost 8 pounds (3 6 kgm.) Physical examination revealed a palipable mass high in the rectum which was confirmed by proctoscopic examination. On September 23 1942 one stage combined abdominoperlineal resection was performed. The liver was clear. On October 16 1942 a course of roestigen therapy was given. The patient was dismissed October 30 1042 in good



I g 3 Case 8 For explanation see legend of Figure 2

condition after a mild unnary infection. The last report was on September 6 1943 when a check up at the clinic revealed no evidence of recurrence Grossly the unigical specimen contained an annular, ulcerative lesion 5 b) 4 b) 2 centimeters, mucosal measurement 7 centimeters above the pectinate hine A total of 44 nodes were found. Microscopically the lesion was an adenocarchoma, grade 4 (Broders) with squamous-cell metaplasia. For distribution and involvement of nodes see Figure 14. The lowest involved node was found between 1 and 2 centimeters below the lower mucosal edge of the lesion.

### SUMMARY OF REPORT OF CASES

Nine cases of carcinoms of the rectosigmoid demonstrating possible retrograde spread have been presented in detail with all pertinent chinical surgical, and pathologic data. In 5 cases all the nodes on the specimens were examined microscopically and in each case approximately two thirds of the nodes found behind and above the lesson were so completely clogged with cancer cells that any further drainage of lymph through their sinuses seemed impossible (Cases 1 2 4 8 9) In 1 case only a portion of the lymph nodes were examined. More than three quarters of these nodes found behind and above the lesion were completely involved with carcinoma and photographic evidence was sufficient to show



Flor 4. Case o. For explanation see legend of Figure

that all other nodes were likewise involved (Case 3) In 2 cases the tusues were so at tensively frozen in cancer that it wis deemed unnecessary to show any further owners of their complete involvement than that demonstrated photographically (Case 5 and 6) Case 7 remains an engma. Whether her terrograde spread demonstrated in this specimen represented an involved node or was a rate instance of periviscular lymphatic per meation is unanswerable. In any event there was not the high percentage of nodal movinement behind and above the kessor considered to be necessary to form a block to the upward flow of lymph.

It may thus be concluded that, when retrograde lymphatic spread down the course of the rectum and its ensheathing structures occurs, it does so as the direct result of a block occurring somewhere across its upward channels and that the contained lymph stream is merely seeking the course of least resistance all normal upward avenues for dramage being closed.

### COMMENT

For confirmation of the mass of evidence against any normal retrograde dissemination of neoplastic cells from malignant growths in the upper part of the rectum and above presented in the preceding pages, it is interesting to refer to the pathologic data which have thus far accumulated in the literature Table I represents a complete summary of such data.

In more than 239 of the 507 cases from the literature in which the removed tissues were completely examined nodal metastasis was observed to occur Of these only 8 gave evidence of an involved node below the level of the lesion itself As the lower level of the lesion was not defined in each case the actual dis tance of these nodes from the lesion can only be conjectured Nevertheless, in 7 of the 8 cases there was no spread below the 2 centi meter level which when interpreted in the terms outlined in this study remains insignifi cant. One case therefore that of Gilchrist and David in which the involved node was 4 centimeters below the lesion represents the total significant retrograde lymphatic flow from carcinoma of the rectum contained to date in the literature When combined with results given previously for our cases only a fraction over 1 per cent of far advanced malig nant growths of the pelvic colon may be ex pected to metastasize in a retrograde fashion If this obtains so rarely in cases in which the patient is already doomed to early demise because of the advanced nature of the lesion one may be justified in making the statement that retrograde lymphatic metastasis never occurs from growths still in the stage of reasonable

Perusal of Table I will further demonstrate that about a half of all neoplastic growths of the rectum when seen at operation do not as yet have nodal involvement. To be certain that this was true over the years from which the cases in this study were drawn Table III was constructed. There it will be noted that in 59 per cent of the cases there was no nodal involvement. To be sure had all these cases shown from 1916 to 1942 inclusive been subjected to intensive study no doubt the 59 per cent would drop below 50 per cent as recent published studies in which the data were so treated indicate (8 16) However the 1 per cent incidence of retrograde lymphatic spread in advanced cases when adjusted to include

NOMA OF THE UPPER PART OF THE RECTUM RECTOSIGNOID AND SIGNOID WINCH THE LESION WAS RESECTED AND GRADED (1916-1942 INCLUSIVE)

GRADED (1916-1942 INCLUSIVA)						
GRAD	ED (19			- 1	Grades (Bro	sed 4
	Tol	al l	(8,00)	jers)		
	١		27	Per cent	Number	Per cent
Nodes	Number	Percent	679	37	1	63
Positive	910	1	1, 60	1	17	1 35
Negative	195		1, 00	00	333	1
Total	2,906	1 00	ستتصل		occi)	na 1

the average type of carcinoma occurring in the rectum (approximatel) 50 per cent with nodes uninvolved) then drops to less than 0 5 per cent and as such becomes negligible Should it not be possible therefore in the light of pathologic evidence and in view of the many recent advances in colonic surgery to preserve the lower part of the rectum in a very considerable number of cases in which the patients heretofore have been deprived of normal sphincteric control (10)? Perhaps time alone will provide the answer but certain it is that such attempts are more than justified and should engage the attention of all surgeons who endeavor to relieve the encumbrances of rectal neoplasms.

# CONCLUSIONS

The following significant features deserve a

word of emphasis in conclusion r Because carcinoma of the rectum is primarily of a low grade of malignancy the disease tends to remain localized for a consid crable period and thus lends itself admirably to surgical attack

2 As carcinoma of the upper part of the rectum and the rectosigmoid has only one normal channel for lymphatic spread-upward-provided local growth by direct exten sion has not incorporated neighboring organs, it should be suitable for radical segmental resection with preservation of the rectal sphine ter and restoration of the normal continuity

3 Radical segmental resection implies the of the bowel removal of a wide section of bowel together with its complete node-hearing region just as the abdominal portion of a combined abdomi nopermeal resection is now performed (tech nique to be reported)

- 4. Section of the bowel must be at least 2 centimeters below the lower palpable edge of the lesion to satisfy pathologic regulre ments. The technical requirements in the successful performance of an adequate anastomosis in this area also involve the removal of such an amount of tissue because of the size and position of neoplasms so located.
- 5 It has been demonstrated that even in far advanced cases of carcinoma in this region. retrograde spread along the course of the bowel occurs to any degree in only i per cent.
- 6 When such retrograde spread can be demonstrated it is an indication that upward normal channels have been blocked. 7 When these facts become more generally
- appreciated and the technical procedures required for such surgery are subjected to refinement many sufferers from neoplastic lesions in the rectosigmoid region will enjoy a normal postoperative existence without the psychologic-to say nothing of the anatomic detriments of a permanent artificial anus.

### REFERENCES

BARGEN J A., and LARSON, L. M. Minnesota M., 933, 16 475-480

2 BRODERS, A. C. Surg Clin. N America, 1941 2 947-96

3. BROWN C. E., and WARREN SHILLDS. Surg Gyn.
Obst. 1938,66 6 -5
BURF, L. A. Practical Proctology Philadelphia
W. B. Sunders Co. 948.
C. Cheatle, G. L. Brit. M. J. 1914, 1 393
C. CLOO, H. S. Practitioner 904, 7 3 5-544

7 COLE, P. P. Brit M. J., 9 3, 1431 433.
8. COLLER, F. A. KAT. E. B. and Machiner, R. S.

Surgery 940, 8 194-3

o. DELAMARE, GARRIEL. The Lymphetics. General Anatomy of the Lymphatics. Special Study of the Lymphatics in Different Parts of the Body By P Politics and B. Cunco. Anthorised Eaglish et translated and edited by Cecii H. Leai. Leader

Constable & Co. 19 5.

10. Dixon C. F. Am. J. Surg., 1939, 46 =-17

11. Duxus, C. E. J. Fath. Bact., Lond 934, 15' 143-

332. 2 Ibid., 040, 50 527-530. 3. DUKES, C. E., and BURKEY H. J. R. Proc. R. Soc. M.,

1041 34 571-573.
4 GARRIEL, W. B. DUNER, CUTHERRY, and BOREY,
H. J. R. Brit. J. Serry, 935, 83 395 41315 GART S. C. N. Lork M. J. 905, 84 1 -114.
16. GILCHREST R. K., and DAVID, V. C. Ann. Ser.

1938, 108 621-042 17 GORDON-WATSON, CHARLES. Lancet, Lond 1938, 1

239-245.

8. GORDON-WATSON CHARLES, and DUKES, CUTERIES.

Brit. J Surg., 930, 17 643-669.
19. GRINWELL, R. S. Anu. Surg., 1942, 16 800-216.
20. HALSTEAD A. E. Internat, Clin. 9 6, 2 86, 2 86.

HAYDER, E. P and SHEDDER W M. Serg. Cyn.

Obst., 930, 511783-708.
22. HERROY J W Brit. M. J 1914, 476.
23. LETTER, ARCHRAILO, Quoted by Miles, W E. (w).
24. LOCKBARY MUNORIZY J P. Discuss of the Retire and Colon and Their Surgical Treatment, P 111, ed ed. Baltimore William Wood & Co 1934

15. MAYO, W J Ann. Surg., 19 0, 51 854-862. so. Ibid 912 56 240-255.

27 Ibid., 19 6, 64 304-3 0.
28. McVar, J R. Ann. Surg., 922 76 755-767
29. Miller, W E. Cancer of the Rectum. London. Har-

rison & Sons, Ltd., 926. 30 MOUSARRAT E. W and WILLIAMS, I. J. Box. J.

Sarg., 19 3-1914, 1 173-182 MOYRIMAN B. G. A. Sarg. Gyn. Obst. 1908, 6 463-466.

31 NEMERICAN, J P Ana. Surg., 1936, 704. 005-974.
33. RAMENT F W and BROWNER, A. C. Sorg. Gra.
Obst., 1928, 46 660-657.
34. SERVICE, P H., and BAROWS J A. Ana. Surg., 7945.

35. VILLEMIN F HUARD, P and MOSTAGE, M. Rev

chir Par., 935, 63 59-80.

56. Wramnuss, H. Quoted by Grianell, R. S. (ro).

37. Wood, W. Q. and Willer, D. P. D. Edinbards

M. J. 933, 49: 381 343.

# RECTAL STRICTURES DUE TO LYMPHOGRANULOMA VENEREUM

# With Especial Reference to Pauchet's Excision Operation

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ESPITE the abundant and ever in creasing literature on the general subject of lymphogranuloma ven ereum surgeons still differ greatly in their opinions as to the best method of treatment of lymphogranulomatous strictures of the rectum The use of sulfonamides and more recently of penicillin has lessened sec ondary infection in these cases, but in no way has it decreased in certain cases the tendency of the disease to progress and develop fibrous tissue that cicatrizes and produces marked

An example of such a patient is presented rectal stenosis. through the courtesy of Dr Marshall E Ross, of the gynecological service with whom one of us (L T W) examined the patient in consultation

S D colored widow 45 years of age a domestic, was seen August 7 1937 She complained of a swelling about the vulva, which began as a small plimple 18 years before, gradually grew larger and was painless. In 1935 because of constipation and pain on defecation she was treated elsewhere with deep The vulval swelling immediately increased in size she had lost weight, was easily fatigued and had pain in the perincum. The Frei x ray therapy test was strongly positive and a biopsy of tissue from the vulval swelling which also involved the anus showed marked fibrosis with round cell infitration and some plasma cells Examination on con sultation in August, 1937 revealed elephantiasis of the vulva involving the anus, a stricture of the vagina, a rectovaginal fistula and a marked annular stricture of the rectum I centimeter above the inter nal sphincter She was advised to have a coloatomy operation but refused. She subsequently moved to Connecticut, and in reply to a follow-up letter her physician wrote under date of November 28 1938 as

when first examined she had large aloughing pedunculated granulomatous ulcerated overgrowths From the Surpical Service of the Harlem Hospital, Dr Louis

P rora to surpeus

T Wight, director

Founders, lecture. Medicochirurgical Society of the District of Columbia, November 5, 945

from the publs in front and including the rectal sphincter behind. The rectal sphincter had been entirely destroyed and the septum between the vagina and the lower rectum was destroyed

a complete excision of the growth from the pubes to the coccyx was done and the wound was closed except for drainage at the angles. For about 2 weeks she did very well and then the wound broke open somewhat leaving a granulating surface, which was skin grafted The skin graft took for the most part. She left the hospital and was up and around

But the wound gradually broke down and signs leeling fairly comfortable. of intestinal obstruction developed Stricture ever narrowing could be felt at the junction of the rectum and sigmoid. As it seemed evident that the infection still persisted in the lower rectum and around the stricture and in the pelvis where a large mass could be felt it was decided to do a isparatomy At laparobe left it was uctified to to a lapse tomy a large dermold growth of the right ovary the size of a grapefruit was found. This growth was removed and in addition a hysterectomy double sal pingo-oophorectomy and colostomy were done bring ing the sigmoid out through a stab wound in the left flank. A resection of the lower segment of the sig moid and rectum including the stricture was also The patient withstood the ordeal remark ably well. She recovered and went home. Later she returned and at that time she had developed squam ous cell carcinoms at the left edge of the vagina at the junction of the vaginal mucosa and skin Ra dium needles were inserted in this growth and the and again she returned to cancer disappeared

She returned in a few weeks with a crater about 2 inches deep burrowing into the left upper leg her bome. toward the femoral artery and the left side of the vagina was involved in this crater sinuses discharged pus which oozed from openings throughout the floor of the crater so that as it was impossible to incise all these to give adequate drainage, the whole crater was congulated. When the alough was removed the crater looked quite healthy and was healing satisfactorily but the patient became increasingly than and emaclated and died. Autopsy was refused so the real cause of death

was not determined although it would seem that it was probably caused by urinary involvement from extension up along the ureters.

"The Frei antigen was continued here for some time and in addition two courses of sulfault ambie and antisyphilitic therapy for weeks were given. Before I saw her deep x ray therapy had been applied to the lexion. It was my opinion that the lexion might be cured by wide excision of the affected area and this is still my opinion. It was my belief that operation had been radiant enough but apparently some of the disease was left behind and gradually progressed."

This case illustrates the progressive nature of the disease its seriousness, the later devel opment of carcinoms with a fatal termination despite all known methods of treatment, including an abdominoperineal resection which here was obviously performed too late to be of value.

### HISTORICAL REVIEW

It seemed worth while therefore to review briefly the historical background of the disease and excision procedures and to report 26 per sonal cases in which we have resected the rectum preserving the anal sphilacter

Lymphogranuloma venereum was isolated in 1913 as a separate clinical entity by Nicholas, Favre and Durand. Frei (6) greatly advanced interest in the disease when he introduced his intradermal diagnostic text which has proved to be specific. Hellerstrom showed that lymphogranuloma venereum was due to a filterable virus. Frei and Koppel (8) and Bensaude and Lambling proved that the majority of non neoplastic strictures of the rectum were due to this disease.

Larsen in 1840 described inflammatory strictures of the rectum in 11 women

The first case of excision of the rectum for stricture was reported in 1864 by Glaser His patient had a recurrence and a years later he had to make a colostomy During the next 20 years several surgeons reported a few additional cases but because the operation was difficult and there were recurrences, the operation was discarded

To Professor Henri Hartmann (10) of Paris, goes the credit for recognizing the seriousness of the disease and giving it careful and prolonged study in all of its surgical aspects. Early in his career Hartmann per formed 16 external rectotomy operations. In ocase did it cure the patient, but it relieved

them, and all of them continued to suppose and suffer a certain degree of incontinence For this reason he gave up the operation Later in 1801 Hartmann and Ouent (11) re ported a series of as cases, most of them then own in which an excision of the stricture was done they concluded that the operation of excusion seemed to tend toward ultimate Since then for a period of annummately 40 years. Hartmann has advocated resection and has successfully performed the operation in many strictures of the rectum Careful histographological studies were made of each resected specimen. In 1020 he reported excision operations then 66 naticals for rectal stricture. An abdominonerined amputation was made in 6 cases and 104tients died a mortality of so per cent. At first the perincal amoutation was made without considering the sphincters and in 50 cases the results were only fair. One of a such patients died Only a patients could be followed and 2 of them were cured. The best results were made by intrasphincteric amputation, and he stated Real cures can be obtained in most strictures not accompanied by profuse Among 27 such amoutations smoouration there were only a deaths, and he states

It was possible to follow at of the patients. There was a recurrence of the stenosis in a cases and a colostomy was necessary in 1 year 4 years, and 6 years after amputation. Eight patients were inproved but continued to suppurate and one of these died at the end of 13 years with diarrhea and sweling of the face, probably due to amyloid degeneration. Twenty patients were cuted of their recibis and there was no stenosis or separation of the macosa An endoscopic examination of the rectum showed that the mucosa was normal in appearance. All of these patients were continent, but the continence was not absolute and when they had durnies they were not able completely to retain their fees Two of the patients complained of having moisture around the anua.

In Hartmann's Chiractic de Rection published in 1931 he has an extensive chapter entitled Rectifies Stenosantes which includes his experiences and many detailed case histories, and he concludes

"The first thing, in contradiction with the reconstructed opinion, is that excession of the rectal states may give complete and definite recovery characteristics indicated from the first, when the recitis

is abundant with suppuration and complicated with multiple fistulas amelionates the state of the patient considerably and makes life bearable. It may be wholly insufficient if the suppuration continues abundantly and above all if hemorrhages take place.

In 1926 De Roche reported 21 cases of fibrous strictures of the rectum in which resection was done with one operative death. Follow up results were obtained in 8 cases which were as follows after 1 year 1 suppurated, 1 had to be dilated 3 had relapsed and 2 had maintained excellent results

Dimitriu and Stoia in 1933 reported 25 cases of abdominoendoanal excision with preservation of the sphincter mechanism. Nineteen patients were cured 3 died and 3 recurred.

It seems that French surgeons were the first to recognize the essential need for surgical treatment of serious strictures of this type. The surgical treatment aimed at (1) correction of the stenosis, and (2) extirpation of all diseased tissue to prevent spread

Lockhart Mummery who represents the best English opinion in his textbook in 1934

If a stricture is noted near the anus very excel lent results in suitable cases are obtained. A modification of Whitehead s operation is all that is necessary to get rid of the stricture. It is not easy as a fibrous tissue outside the stricture prevents the separation of the mucosal membrane in the normal manner and this renders it difficult. When the stricture is more than one inch from the anus, the method is not possible and a formal excision similar to that for malignant disease is necessary. The operation of excision of a portion of the rectum for nonmalignant stricture is not one to be lightly undertaken, as a stricture serious enough to warrant removal of this portion is almost certain to be associated with a dense amount of fibrous tissue in the surrounding parts, which makes the anatomy quite abnormal, and may cause great difficulty in separation of the rectum.

In none of his published works has Lockhart Mummery shown any enthusiasm for the excision operation as a method of treatment for rectal strictures.

Martin, in 1933 reported a senes of 227 rectal strictures in negro women and concluded that the disease is incurable and tends toward an inevitable fatal termination, but nowhere does be suggest a definite method of

treatment. Spiesman Levy, and Brotman in a study of 183 strictures from the Cook County Hospital reported 2 resections one done by Davison and one by McNealy

Edwards and Kindell reported satisfactory results in 6 cases in which they made a preliminary colostomy and later did a perineal extirpation of the diseased rectum according to the technique described by Lockhart Mummery for rectal malignancy

Barber and Murphy from Bellevue Hospital reported 35 cases of resection 4 were one stage sacroperineal and 31 were abdominal colostomies followed by sacroperineal resections. Five of their 35 patients died, which gave a hospital mortality of 14 3 per cent. These 5 were extreme cases and there were no immediate postoperative deaths. They stated that in 2 patients who had had an original colostomy the colostomy ceased to function after the granulomatous process crept up to and involved the sigmoidostomy stoma. They made a permanent abdominal anus in their advanced cases. Two cases showed carcinoma

Woods and Hanlon in 1944, reported from the Cincinnati General Hospital 35 cases treated by rectosigmoid resection. In analyz ing 102 cases of rectal stricture they stated that 'colostomy has been usually employed at an advanced stage with no constant success They performed in arresting the disease. colostomy without resection in 34 cases 2 died of postoperative complications radical resection was performed in 35 cases. With no operative deaths, abdominoperineal resection was performed 23 times with good results in 20 of the 23 cases. In the perineal resection of the Lockhart Mummery type in 9 cases the results were good in 5 poor in 2 and fair in 2 They emphasize, however that the resection operation is a procedure of considerable magnitude and should be undertaken only after conservative methods fail. They con clude though, that the abdominopermeal resection is a satisfactory operation and that they have never seen resolution of firm fibrous strictures.

From the above résumé and from a study of other available literature, it becomes apparent that the general attitude in this country and in England up until about 5 years ago was that these cases were best treated by dilata ton if the lesion was apparently mild, and by a permanent colostomy if the patient's condition was at all senous. Only in the reports from the Beltumore Ctty Hospital by Edwards and Kindell from the Bellevue Hospital by Barber and Murphy and from the Cincinnati General Hospital by Woods and Hanlon have American surgeons shown any indication of their appreciation of the definitive treatment of this senous malady

Our own expenence coincides with that of Hartmann, namely that drugs dilatation and other simple procedures can in no way take the place of radical surgery in the treat ment of advanced rectal strictures. The increased tendency on the part of some American surgeons to use excision as an operation of choice indicates their recognition of this fact.

At Harlem Hospital we have had 4 deaths following dilatation of rectal stricture while Woods and Hanlon report 7 deaths following the same procedure at the Cincinnati General Hospital. There is no doubt that many deaths as a result of bougle or instrumental dilatation of benign strictures of the rectum have occurred throughout the country but the cause of death has not been so reported

Liccione was the first to report carcinoma as a sequela of rectal structure he recorded 2 cases. Woods and Hanlon reported 3 cases, and 3 cases were reported by Barber and Murphy from the Bellevue Hospital. We found records of 3 cases in the hospital and one of us (L. T. W.) observed another case in private. It is noteworthy therefore that the incidence of a superimposed carcinoma of the rectum upon this apparently benign lesion occurs much more frequently than is supposed.

We have used, in the treatment of these strictures every form of mild treatment excepting x ray and this includes finger dilata then dilatation with Wales beigges, posterior proctotomy in some instances, in rare cases Keller's tunnel grafts sulfonamides, Frei antigen dathermy carbon dioxide anow none of these availed but little in the serious cases. We have found that posterior proctotomy operations, followed by bouginage, give temporary relief but that in the final analysis thy serve only to spread the disease

and to make the stricture more rigid. Levy Holder and Bullows, from our out-patient department, reported good results with sodims sulfamilyi sulfamilate but the end-results have not been up to expectations in fact, some of the patients so treated are still coming back to the clinic and no doubt others have windered off to other hospitals.

Many of the unconsidered factors in the difficulties of the palllative methods of treatment of strictures particularly in colored people are due probably to the fact that or tain fibrous these reactions such as heides and elephantiasis, are predominant in colored races. Rosser used this observation to explain the frequency of rectal strictures in engone and postulated that they had a tendency toward fibroblastic tissue hypertrophy. This

has been our experience. Colostomy has been the ultimate procedure used in most clinics when the patient s life is obviously threatened Many colostomies have been performed by us for relief of benign rectal strictures in females. Seven patients entered the hospital with colostomies done chewhere 5 patients showed a stricture of the colostomy opening after operation 4 patients needed another colostomy Some authors have claimed that colostomy alone tended to cure or soften the strictures. This is, of course, absurd. It is true that ulceration, secondary infection and toxemia resulting therefron have been lessened by diversion of the feed stream but we have never found that colortomy cured a real fibrous stricture of the

rectum Experienced surgeons know that colostony per se is not without certain specific dangers This is true even when performed by surgeons of ability and great experience. These dangers are first, stenosis or a stricture of the colostomy opening Such stricture occurs a few months or a few years after the artificial anus has been made. It happened in 5 of our cases and in 2 patients admitted from other hopitals The second danger is retrograde or antenorgrade hermation of the bowel. This her niation occurs when the opening m the abdominal wall is too large If the proximal segment of the bowel is mobile an antenor grade herniation occurs. This occurred in 4 of

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our cases If the distal end of the sigmoid is mobile a retrograde herniation occurs this happened in 3 of our cases and in 2 patients admitted from other hospitals. It is impos sible to foretell whether any of the above compheations will or will not occur following a colostomy We have seen secondary opera tions performed and deaths occur because of all of the above complications Therefore, it is our conclusion that colostomy although successful in some instances, 15 not and cannot be the best surgical answer to this problem. At best, it can serve only as a definitive method of treatment when no other rational option is available Aside from the surgical complications many patients will go on to their deaths and refuse help rather than have an artificial anus, and particularly is this true in young women in the early decades of life. It is likewise true that when the disease in volves the entire rectum or extends up to the agmoid, one has no choice but to advise a permanent colostomy with or without a sacroperineal resection otherwise the patient unquestionably dies.

We have seen patients with dangerous and serious sequelae which followed colostomy operations, even in the hands of experts. When there was marked stenosis of the colostomy opening-and these cases are numerous in colored people-we have had to perform another colostomy in the transverse colon Many strictured colostomy openings develop abscesses and fistulas. We have also had to treat some of the so called permeal resections done at other hospitals for serious late infection, which in one instance, extended up to the fifth dorsal vertebra (Figs 1 and 2)

The seriousness of this disease is further emphasized by Kassebohm and Schreiber who have reported from the Obstetrical Service of Harlem Hospital deaths due to the rupture of the rectum during spontaneous delivery and instrumental delivery and they consider it a very senous complication of pregnancy in fact, they recommend either therapeutic abortion if recognized early or

We agree totally with Hartmann that the cesarean section if late. treatment of choice of low strictures of the rectum is excision. We further believe that as

our technique improves the mortality will become lower It is also our opinion that sur geons in clinics who see large numbers of these cases will eventually come to this con

CASE REPORTS

The first patient was seen and operated on clusion in private by one of us (LTW) A brief ab-

stract of her history follows C M colored female, married, 34 years of age mother of one child 12 years of age was first seen in the office in November 1924 at which time she complained of an abscess near the rectum She was compained of an assess near the rectum She was emiclated, anemic, nervous, and weak. The only other essential point in her history was that she had had a history of having 7 operations for perrectal had a history of having 7 operations Constitution, deformed stools and at times passage of blood and nucus from the rectum completed her history Ex amination revealed a stricture of the rectum which would barely admit a No 24 F catheter Two figu lous openings were present on the right side of the rectum The perineum showed perianal and peri proctitic thickening in December, 1924, posterior procure unexcuing in December, 1924, posterior proctotomy with wide excision of all fistulous tracts was done. In October 1925 left inguinal colostomy was performed In January 1926, the rectum was excised preserving the external sphincter mechanism according to the method of Victor Pauchet. Conva lescence was slow but uneventful and complete healing of the perineal wound did not occur for a period of 2 months. This patient frankly stated that she would prefer to die rather than have a perma nent artificial anus and that she would willingly undergo any risk that would offer her a chance of health. Later the colostomy was closed. In the apring of 1945 19 years after her original resection this patient reported that she was in excellent health.

This first patient, with several others was demonstrated at a symposium given in 1938 by the surgical department of our hospital in honor of Dr Wilhelm Frei. Because of the satisfactory result in this case we were stimu lated to use the method beginning in 1931 on the surgical service of Harlem Hospital, and the authors of this article constituted an in door group for the clinical study of these cases. All of the second stage operations were performed wholly or in part by the senior

We have used this operation in 26 cases author (L. T W) The following is an illustrative case referred to

J G colored woman 26 years of age married 5 the senior author years, never pregnant, husband living and well.

History of rectal bleeding, pain during defecation with a ducharge of pus and mucus from the rectum which a discretize of possion much from the rectum during the past 4 years. She had been hospitalized caring the past 4 years one had been nonpressured on two or three occasions for dilatation of the stric on two or tures occasions for quantum of the stricture without much permanent relief. She had been ture without much permanent retter one nau been having chills and fever off and on for the Past 2 naving count and sever on and on for the past a years. Physical examination revealed a tight annu years. Paymens examination revenues a tigot annu-lar stricture of the rectum one half lach above the as stricture or the section one man men above the same which did not admit the tip of the little finger anus waxes use not assume the up or the fittee unger.
The blood count showed 4,000,000 red blood cells, And show counts answer a, occopion reu mond cents, 8 coo leucocytes, 74 Per cent polymorphomedean a oor sencestra, 74 per cent payment productions and per cent lymphocytes 55 per cent hemoglobia. so per cent symphocytes 55 per cent nemogioun. The Frei tent was strongly positive. Urinalysis showed occasional white blood cells and red blood anowed occasions; white smoot cens and ten successions 1.2 lives nitrocein nicou communy creatining 17 urea muto-gen 13 augus 75 Wassermann test negative. Colosgen 13 sugar 75 Vassermann test tressure: Conce-tomy was performed May 11 1936 (Fig. 3) She was discharged May 31 1936

She returned on October 5 1936 for the accord or excision stage of operation, which was performed or extensos stage or operation, which was performed on October 6 Pathological report by Dr. Solomon on October of Establishment reports by 5 by 5 centil meters. The mass had an irregular modular surface, with moderate hemorrhagic discoloration of the with moderate nemorrhagic unconstation of the surface. The mass itself showed marked fatty infisurface, the mean fiber shower market lately lumi-tration and on cut surface had a grayish white phone appearance and extremely firm consistency nurous appearance and extremely urn consistency Microscopic diagnosis acute and chronic inflamnation of the rectum with fibrosis. She was discharged on December 6 1936. On March 1 1937 she returned for closure of the colosiomy and was discharged May 32 1937 Figure 4 shows the con dition at the time of her discharge. In reply to a ention at the time of the referring physician wrote on December 14 1043 as follows

I cramined Mrs. G in 1043 for some other consymptoms what soever Examination bowed a
somewhat Patulous but perfectly competent anua.
At the end of the examining finger creatily there
striction. The patient weighed 35 pounds more than
the did in 1936, and she felt vory well.

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In the 26 cases, in which the above procure was carried out, 2 deaths occurred in the hospital One death occurred on the day to appreciate the fact the patient was in secondary shock and needed a translusion. Another patient died of pentonitis following cleaure of the colostomy by one of the asso-

ciate surgeons on the staff death, of counce, was not attributable to the excusion operation. We have been able to follow 12 patients, 7 to 19 years after operation and the result in 8 19 years actual actory One patient still had sinuses on each side of the rectum which inter mittentis drained a slight amount of pur thr patient showed oaseous involvement and was reported as such (28) showed a slight tendency toward rectal prolapse where the mucosa had separated from Another nations the skin margin. One patient showed a ste nosis at the anal margin. One patient became psychotic. It is of interest to note that in all of these patients, excepting the one with the draining sinuses the disease was completely eradicated also that 8 of these patients had an excellently functioning anus with control over their bowels except when they took hustire.

TECHNIOUE The operation was performed in three stages in 24 of the 26 cases. The following drawings Figures 5 6 7 8 9 10 and 11 which are after Pauchet, and No. 12 which is diagrammatic-illustrate various steps in the operation. The first stage is the making of . temporary colostomy After the colostom and when the general condition of the patient has improved to the point where it is felt that she can withstand a resection, an effort is then made to disinfect the distal argumed and rectum in so far as possible as a preliminary to resection of the rectum. The second stage is the stage of resection and after this has healed, the third stage is to close the colortomy The time interval between the different stages varies according to the clinical condition of the patient.

to Early in our studies we used barnine earns to determine the length and extent of the strictured area, but we soon found that its reward was more a disadvantage than an advantage, the reason being that, although the procedure of the stricture the barnin often became inspirated above the stricture and was extremely difficult to remove. We later learned to investigate the extent of the stricture when the abdomen was open while we were performing the colosiony. Before any operation is



Fig. 1 Patient C. A. Appearance on admission November 10, 1036, of an abdominoperineal resceition of a stricture performed at another hospital o months previously on junc 3, 1038. Sie was emacated weak, and dehydrated The infection had burrowed upward along the supraspinous Beament to the level of the fifth dorsal vertebra.

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Fig. 3. Photograph of temporary colostomy Patient J. C. May 31 936.

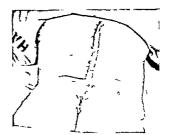


Fig 2 Patient C A Appearance at time of duscharge March 939. The entire area of infection was opened widely and packed with zine peroxide, which resulted in healing.

Two low strictures were resected in a one stage operation without colostomies having been previously performed (Figs. 13 and 14). In these 2 cases it was possible to resect the rectum without entering the peritoneal cavity and the healthy rectum was brought down intrasphincterically and sutured to the sur rounding skin. The only trouble with this procedure and for that reason we gave it up is the fact that although it cures the patients of their disease and their stricture it also brings the cervix of the uterus down to the vaginal introitus, and to this condition the patients later objected strenuously

In performing a colostomy for stricture of the rectum the sigmoid and rectum are examined carefully as to the length of the stricture the extent of infiltration of the disease and a search is made for enlarged lymph nodes this information is used as a basis for deciding for or against resection. In a few



Fig. 4 Patient J. G. Appearance of operative site 3 months after excision stage. Condition unchanged when examined 8 years later.

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Fig. 3. Photograph of temporary colostomy. Patient J. C. May 3. 1036

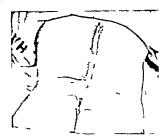


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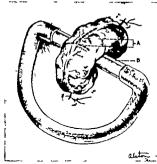


Fig. 5 Drawing of colositomy at time of opening A Lines of incision used. B Glass rod or Makins 1 be which holds up the loop.

cases not included in this series, the surmoid

was found to be plastered down to the poste

rior abdominal wall and the rectum and my

mold exhibited thickening of their walls and

luminal narrowing which rendered them

obviously unsuitable for reaction. In one patient, not included in this series, following resection the new anus cicatrized to such a point that we were not able to close the colostomy. This patient refused further treatment because also was satisfied with the colostomy. There is however no evidence of active disease around the rectum. In a large number of colostomies performed by as in

patient, not included in this series, following resection the new anus cicatrized to such point that we were not able to close the colostomy. This patient refused further test that the colostomy is a statisfied with the colostomy. There is however no evidence of active disease around the rectum. In a large number of colostomies performed by us in this disease we have searched carefully for line and other glandular enlargement this se have never found. For anemia at first used ventriculin with iron which helped to overcome the anemia rapidly. All of these patients gave a positive Wassermann reaction. In general, these patients at the time of the Internal time colostomy were usually emic.

In general these patients at the time of the preliminary colostomy were usually emanated tonic, and in very poor general chief condition. They were allowed to go bore until their clinical condition improved, which was 3 or more months, after which they were brought back for the second stage of the operation which was the excision of the return with preservation of the sphincter. After the latter stage which required usually from 4 to 8 weeks to heal the patients were allowed to go home for a few weeks, if they so desired,

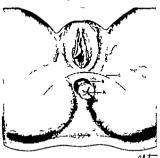


Fig. 7. A Button of skin around anus. B Sphincter and muscle exposed following dissection of anal mucous membrance. C Line of curvilinear incision (drawing after Parchet)

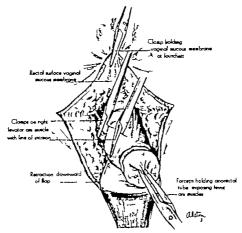


Fig. 8. The lower flap contains the sphincter and muscle (drawing after Pauchet)

after which they would return to have the colostomy closed. It should be pointed out that these patients because of their poor clinical condition before the colostomy and because of the magnitude of the second or excision stage require a longer period of bospitalization than do most patients and during this time they require careful supportive treatment.

The technique used was not original with us, but we followed in the main the one described by Pauchet Preliminary to the resection stage of the operation it was our custom at first to instill thrice daily 2 ounces of a to per cent solution of argyrol into the distal segment so as to render it as bacteria free as possible later we irrigated the rectum through the colostomy opening with a 1 5000 solution of zerohiran Ether anesthesia was used

The anal sphincter is dilated fully the anus is closed with a heavy silk suture and an area of skin about the size of a silver dollar is dissected up exposing the external sphincter

muscle The mucous membrane lining the anal canal is freed with scissors and blunt dissection just as in the Whitehead operation for hemorrhoids. The stricture is usually located at the junction of the rectum and the internal opening of the anal canal A curvi linear incision is made that extends from near the tuberosity of the ischium on one side upward to the fourchette and then downward to the area over the tuberosity of the ischium on the other side. The anterior wall of the rectum is then separated from the posterior wall of the vagina At times the rectum is unavoidably opened at this point, but where this has happened no serious infection has developed

The levator ani muscles on each side are divided between clamps close to the rectum and ligated. At this time one cuts through much scar tissue which bleeds and oozes very freely this hemorrhage is controlled by the frequent use of hot pads. After a partial dissection of the stricture from its surrounding

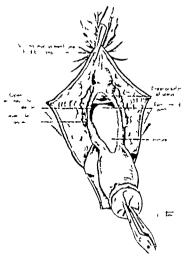


Fig. 6. Th. pouch of Dougla h. been opened (dra. g. after Lauchet)

tissues the apron of skin which carries in it the phincter muscles is allowed to fall forward and downward. The firm rectoeoccygeal ligaments are divided and retractors hold the skin flap downward. The rectum is then easily freed in the hollow of the sacrum and its lateral fascial attachments above the levator and muscles are divided.

The peritoneal cavity is entered through the pouch of Douglas. The rectum is pulled down to a point above the strictured area. The superior hemorrhoidal vessel and all other bleeding points are carefully ligated. The diseased portion of the rectum is excised at a point through healthy rectal tissue. The proximal end of the rectum is brought down intrasphincterically and its margins are su tured to the skin edges with interrupted black.

silk sutures which bring the rectal mucos membrane in direct contact with the sin Two I enrose or eigerette drains are placed into the peritoneal cavity one coming out at the lower angle of the wound on each side at shown in the illustration (Fig. 11). Yield of viseline gaure is placed in the new anal cand

The patient is given a blood translusion, go cubic centimeters of blood immediately after the operation and she is watched very closely during the next 4 hours for the possible during the steel possible of the possible of

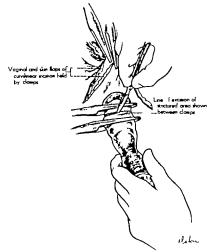


Fig. 10. Division of the rectum proximal to the stricture (drawing after Pauchet)

high Fowler's position. After the rectal operative site is healed the colostomy is closed

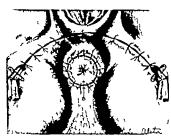


Fig. 1: 1 Drain which extend up int. the pouch of Doughas. B New anal can 1 (drawing after Pauchet)

### **OBSERVATIONS**

In performing the preliminary colostomy it is important to use the segment of sigmoid

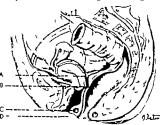


Fig. 12 Diagrammatic cross-section few at end of operation A Cut edge of peritoneum. B Rectum C Sphincter and muscle D Suture approximating mucous neembrane to skin.



Fig. 3. Patient H. F. Photograph of Introfun of patices 4 sho had some tage resection 4 years previously A. The cervix at the opening of the vaginal canal. This patient became perganat and was delivered by ceasuran section, year after resection of the rectum. Thirteen years later this patient has a well functioning arms but her cervix is still at the introfuse hich condition she has refused to have corrected.



Fig. 13 Operative specimen patient C. W. age 24, years. Stricture complicated with rectovaginal firstine. First stage December 4, 926. Second stage May 1937, at which time specimen was removed. Colostomy losed February o, 928.



Fig. 14. Patient N. H. Operative site a years after one stage resection. No evidence of disease. Well function loss annua and protum.

that is at the highest point above its mobile part. This step will permit the segment to be drawn down when the rectum is resected. In one instance this point was not observed when a colostomy was performed and, during the resection stage of the operation, after the rectum was freed and the diseased porton excised, there was not sufficient mobility to permit the bringing down of the healthy end of the rectum to the skin This patient developed a psychosis upon learning that she would have to keep her artificial anus and she was transferred to a mental matitution where she died. It is imperative that the highest mobile point of the sigmoid be the site of choice for the performance of a preliminary colostomy if the stricture is resectable. If the stricture is not resectable the making of a colostomy at that site for a permanent artificial and B dangerous because there may be the development, later of a retrograde herniation in a few cases.

With the advent of the sulfonamides, particularly sulfasuxadine which has been a boo in lessening infection in the large bowel, it is possible that we may be able to do their sections in one stage and open the pentional cavity without danger. This we have not retarmpted. We still believe that the three



Fig. 16 Patient M B. Anal tumor, stricture of rectum, and fibroid of uterus. Colostomy and hysterectomy May 14, 1932. Reacetion of tumor with stricture by dividing lower third of vagins and sphincter muscles. Closure of colostomy October 8, 1932. Follow-up 12 years later showed good regults.

stage operation of preliminary colostomy fol lowed by resection when the clinical condition of the patient has improved and followed by the closing of the colostomy is the procedure which gives the patient the greatest protection

Sometimes these patients present tumor masses around the anus which have to be excused at the time of the second operation Figures 16 and 17 show the external appear ance in 2 cases in which resection was done and the end results were excellent.

Dr Milton J Schreiber from the obstetrical service reports that he has delivered sponta neously 4 of the patients who have had excision operations in this series without any ill effects

We have had no experience with Hart mann's method of penneal resection the Lockhart Mummery method of resection as used by Edwards and Kindell and Barber and Murphy and the modification as used by Woods and Hanlon In all of our cases we have preserved the sphincter a point which Hartmann later conceded to be important although his operative approach was sacral rather than the approach which was used by Pauchet.



Fig 17 Patient V B Anal condition at time of admission in 1934. Three stage operation. Well functioning anusin 1945 at which time she was on the gynecological service for a pelvic mass. No signs of anorectal disease.

It should be clearly understood that the operation of excision is a very serious operation and one to be used only in selected cases and by surgeons of experience. It should not be performed by the surgeon who does this type of operation only occasionally although we are certain that as a given surgeon soperative experience with the disease grows his results will improve. It is hoped that early diagnosis and the use of chemotherapy will obviate the necessity for the use of surgery in these cases before a true rectal cicatricial stepois has occurred.

### CONCLUSIONS

- I Resection of the rectum with excision of the diseased area and preservation of the sphincter is the treatment of choice in certain selected cases of fibrous stenotic strictures of the rectum.
- 2 Permanent colostomy may have to be performed as an operation of necessity when the disease is so extensive that it cannot be resected with ease
- 3 Abdominopenneal resection may be justified in certain cases in which the stricture extends so high that a sphincter preservation operation cannot be done
- 4 Twenty six cases in which resection of the rectum with preservation of the sphincter was performed according to Pauchet's tech inque are reported with 2 immediate deaths

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and a later death. These 2 immediate deaths were preventable and cannot be ascribed to the operation her se but to our inexperience bollow up of 12 cases shows that the disease was cured in all but one and this one pre-ent fistulous openings which drain intermittently due to hone involvement

- s Pauchet's operation has proved a satis factors procedure in our hands an I is worths of further trial
- 6 Two very low strictures were resected in one stage and they resulted in complete cure 7 Early diagno 1 in our opinion fol

### lowed by an excisi n operation is the best treatment for tibrou - trictures of the rectum

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# LIGATION OF THE INNOMINATE ARTERY FOR INNOMINATE ANEURYSM USING RUBBER BANDS

### Report of a Case

JOSIAH C TRENT M D F.A C.S., Ann Arbor Michigan

F the fewer than 100 operations per formed on the innominate artery since Valentine Mott's initial report in 1818 approximately 25 per cent have been for innominate aneurysm. Green ough in 1929 collected from the literature 91 ligations or attempted ligations of the innom inate artery only 17 were performed for aneurysm of this vessel and in only 13 was the artery actually tied In 1937 Rundle added 8 cases to Greenough s 13 (3 of these Greenough had listed as subclavian aneur vsm)1 and Brock in 1941 added another From these reports and including the present case it appears that the innominate artery has been ligated some 23 times for aneurysm

The relative infrequency of ligation of the innominate artery for aneury sm is understand able because of (i) the rarity of the condition (innominate aneurysm accounts for less than 3 per cent of the total), and (2) the high mortality of the operation (Table I). A successful case was not reported until 1911 by Sargent although Cuneo according to Guinard successfully ligated the innominate artery for aneurysm in 1905. Many more successful ligations have been performed during the past 25 years but the procedure remains hazardous with secondary hemorrhage still the chief cause of death (Table II).

Greenough gives a detailed description and analysis of the types of operations employed on the innominate artery including proximal or distal ligation or both ligation of the in nominate and subclavian or carotid vessels triple ligation of the innominate subclavian and carotid arteries triple ligation and excision of the sac and innominate carotid and excision of the sac and innominate carotid and

From the Department of Surgery Duke University Hospital, Durham, North Carolina.

Early reports of ligation of the innominat artery for aneuryum are frequently difficult to interpret because of the failure of the uthors t describe the exact location of the lesion

TIBLE I —MORTALITY IN 28 CASES OF OPER ATION ON THE INNOMINATE ARTERY FOR INNOMINATE ANEURYSM

	Ligation	Mortality	Attempted legation	Mortality
Greenough	13	6	4	4
Rundle	8	3	i	t
Brock	1	1	0	0
Trent	1	0	0	•

Total 23 10(43 5%) 5 5 T tal number of cases—28 Mortality--15 (53 5%)

vertebral ligation in which silk hemp ox aorta ox peritoneum kangaroo tendon car bolized catgut chromic catgut horsehair silver wire and many other materials were used as ligatures. He concludes that multiple ligation is advisable combinations including the subclavian surpass those with the carotid and the vertebral should not be included

After careful evaluation of the operative treatment of innominate ancurysm Rundle reaches similar conclusions (1) if an attempt is to be made to ligate the innominate trunk it is essential to split the sternum otherwise access is inadequate and the ligature may fail to occlude its lumen (2) Simple proximal ligation as a method of treatment is most un suitable while necessitating as thorough an exposure as the more complete operation it gives the poorest results and is too prone to be followed by cerebral vascular complications.

In any type of ligation of the innominate trunk there are two circulations to consider

TABLE II —CAUSES OF DEATH IN 15 CASES OF OPERATION ON THE INNOMINATE ARTERY FOR INNOMINATE ANEURYSM

Secondary hemorrhage Cerebral complications Shock Tracheal compression	7 (46 6%) 3 2	
Traction on sorts Uremia	1	
Total	s	



Fig. Anterior and lateral views of the patient days after operation. The operative scar is clearly visible. The ancurymal mass no longer pulsates but is approximately the same size as on similation.

the peripheral and the cerebral Greenough in 75 ligations found no cases of gangrene of the homolateral arm although there were several cases of atrophy There were 7 deaths from cerebral lesions some of which must be attributed to ischemia

Although the recommendations for surgical therapy outlined above are sound they are not always applicable a fact well illustrated by the following case which presents several un usual features namely (1) the approach to the innominate artery was through the chest rather than the sternum since it was feared that manipulation of the sternum or clavicle would result in the tearing of the wall of the aneurysm (2) rubber bands were used to ligate the vessel and (3) the aneurysm completely disappeared following proximal ligation of the innominate trunk

### CASE REPORT

R. W A 51137 52 year old colored male was first seen at the Duke Hospital November 11 1940 At that time he had a strongly positive blood serology and annal fluid A diagnosis of central nervous system syphilis was made and the patient referred to the local Department of Public Health where is received a course of antiluetic therapy

He returned to the clinic May 37 104, 18180 that 1 month prior to his whit a small host the size of a walnut had appeared suddenly at the bar of his neck on the right after a seven coupling sed The cough had continued and the knot had great rapidly in sure. He had no obstruction to his breathing but had noticed some houseness and dryshap into the complained also of throbbing headeness when the complained sho of throbbing headeness when the complained sho of throbbing headeness when the complained sho of throbbing headeness when the complained had not be synchronous with his heart beat.

seemed to be synchronous with an acceptable problem. Physical caramination revealed face peaks, a blood pressure of 148/110 in the right are as 14/700 in the left a heart slightly enlarged to the with an irregular rhythm due to dropped best, as a late disastole murmur over the aordic are, as above the clavicle and resting on it was a large plasting definitely expansion meaning against the problem of the property of the meaning again instally 10 by 18 by 7 centimeters (Fig. 1). The standed beyond the middle silbooth it was prominently on the right. The trackes was natice deviated to the left and laryupocopic canalation was unsuccessful. The size of the ancuryup problems.

ited anteflexion of the head.

Roentgenograms of the chest (Fig. 3) shored alight enlargement of the heart to the left with sent alort to still the chest of the tortunosity of the aorta but no definite agent) as of this vessel. A shadow in right supracardiac regas

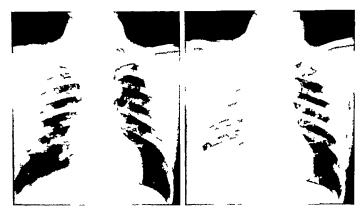


Fig. 2. a., Preoperative roentgenogram of the chest showing the shadow in the right supracardiac area characteristic of an enlarged innominate artery alight enlargement of the beart to the left and tortuouity of the acrts but no def

inite aneurysm of this vessel. The traches may be seen far to the left. b Seventeenth postoperative day Roentgenogram of the chest showing the elevated disparagm on the right.

was characteristic of an enlarged innominate artery The trachea was displaced considerably to the left.

A diagnosis of aneurysm of the innominate artery and possibly the right common carotid artery was made and the patient referred to the surgical clinic for consideration of ligation of the innominate artery

He was admitted to the surgical service on June 16 1944 stating that the mass in his neck had in creased in size since his last visit to the clinic. The physical findings were essentially unchanged over those last recorded except for a slight increase in the size of the aneurysm

The accessory clinical findings were as follows hemoglobin 13.4 grams (86%) red blood count 4 160 000 white blood count 6,360 blood Wasser mann reaction positive Kahn positive Kline and Mazzini tests negative Spinal fluid tests showed Wassermann reaction cocco colloidal mastic test oocooo Pandy negative cell count o

Fluoroscopy and films of the chest showed the changes described The electrocardlographic record was indicative of coronary artery disease.

A diagnosis was made of syphilitic aneutysm of the innominate artery syphilitic cardiovascular disease with cardiac enlargement and myocardial dam age from coronary involvement aortitis and dila tation of the aorta.

During the 9 days the patient remained in the hospital before operation the aneurysm increased visibly in size, and rupture appeared imminent. Therefore in spite of electrocardiographic evidence of coronary involvement and the attendant high operative mortality ligation was recommended A week before operation patient was given a cubic

centimeters of bismuth subsalicylate intramuscularly On June 24, 1944 with the patient supine and under pentothal and endotracheal 50 per cent ni trous oxide-oxygen anesthesia, a hockey-stick incl sion was made over the second rib anteriorly on the right extending vertically along the lateral border of the manubrum to the jugular notch. The under lying pectoral muscles were cut and the second rib exposed and resected as far laterally as possible The costal cartilage was rongeured away to the sternum care was taken not to injure the mammary vessels. The pleural cavity was entered through the rib bed In order to obtain better exposure the third rib was divided laterally and medially. The under surface of the aneurysm could be visualized readily and palpated at the apex of the pleural cavity. The pleura overlying the great vessels was divided and reflected back. The innominate veins and the su perfor vena cava were separated from the underlying arch of the aorts and the innominate artery and retracted exposing the greatly dilated innominate trunk which measured approximately 4 centimeters in diameter at its junction with the aorta. By careful manipulation and dissection a large goose neck clamp was passed under the vessel and a cotton tape placed around the artery (Fig 3) It was feared

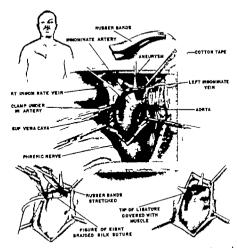


Fig. 3. The right chest was entered through a bockey stick Incideo over the second rib (left upper inset). The pleura overlying the great excels as a Incide, the 4th pushed back, it wells retracted, and the innominal sattery proped. Vegoes need lamp was passed behind the artery and two rubber band pulled through by serias of tage (central cut). The rubber hands or estretched and satured anteriorly using heavy braided slik (left lower inset). The ends were triumed and the prestuding bloic overed with musels (right lower baset).

that secondary hemorrhage might follow ligation of such a large thin wailed vessel with a narrow non classic ligature. Therefore two new rubber band

2 millimeters in width and 75 centimeters in length were obtained a sturred to the tape and drawn under the vessel. The bands were then pulled up very snugly sensel the bands were then pulled over the anterior of the bands were then pulled of the vessel and a sturred to retain a cochided there was immediate cereation of pulsation in the ancuryam and right superficial temporal artery and the blood pressure and pulse in the right arm could no longer be obtained. After the rubber bands had been trimmed, a small nubbin remained which hay immediately beneath the finon lants veins, and the possibility of erosion into these vessels had to be considered. To obviate this, a piece of muscle was sutured over the stiff protuding ends, to form a soft pud between the ligature and

vessels. The wound was then closed in automatical vers, with cost mouse chromic o Duker sturf for the pieura, interrupted double medium crotton for muscle and fissels and interrupted fine cotten for subcutaneous theuce and size Patients stood per action well and returned to ward in good coofficial.

Following the operation no scakees of the bala lateral arm or opposite side was noted. He bala fairly stormy course for the first 3 days due to the fourth day following penicillin and saintenance therapy his temperature returned to normal the fifteenth day small teodr fluctuats areas eveloped over the creet of the accorping. The sort yarm no longer pulsated but had not decreased a preciably in size. Application of the fluctuation are vielded pus and blood which control gram post tive occi. To forestall spentaneous rupture, a small incluon was made in the skin at the point of segments.

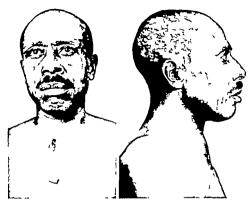


Fig. 4. Three weeks postoperative. Anterior and lateral views of the patient abowing almost complete disappearance of the mass. The opening of the small draining sinus can be seen just above and to the right of the jugular notch

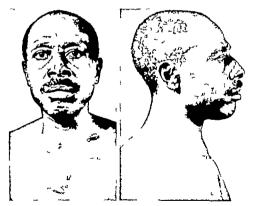


Fig 5 Six weeks postoperative. Anterior and lateral photographs show a further decrease in the size of the mass. The opening of the supraclavicula sinus tract! evident.

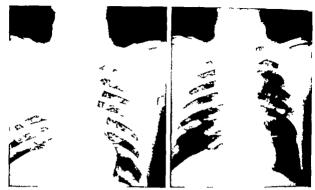


Fig 6 a, Roentgenogram of the hest made approximately 3½ months postoperatively showing prominent shadow over the right apex displacing the sortic arch t

the left b, Roentgenogram of the chert made 154 months after operation showing clearing of the right aper with residual mass in the region of the humania te artery



Fig. 7 Ten months postoperative. The mass has completely disappeared and the sinus tracts have healed. The outline of the right sternomastical muscle is clearly vis like. Subjectively the patient is well.



Fig. 8. a, Ten months postoperative. There is a large dense mass in the right supracardiac area at the site of the ligation. The traches is practically in the midline. The

diaphragm has descended b, A kymogram made of the chest reveals no pulsation of the mass which has been described in a.

tion and 100 cubic centimeters of pus, old blood and thrombus were expressed from the neck. No hemorrhage ensued Following this, the mass in the neck disappeared (Fig 4) Compresses were applied, the inflammation and induration subsided and healing occurred except for a small persistent sinus A chest plate on the seventeenth day showed the chest to be clear with the traches still slightly deviated to the left. The right duaphragm was ele vated and fixed from stretching of the phrenic nerve at operation (Fig ab) A slight pulse was felt in the right arm on the seventeenth day but the blood pressure could not be recorded. The blood pressure in the left arm was 118/76 Oscillometer studies of the right arm revealed a maximum of 2 units pulsa tion above the elbow. An electroencephalogram showed no depression of cerebral activity on the right. He was discharged on the twenty first day with instructions to continue his antiluctic therapy

On August 7 1044, the patient was readmitted to the hospital complaining of bleeding from the site at which the infected ancurysm had been drained (Fig 5) Physical examination and chest findings were

essentially as on discharge July 14, 1944. While in the hospital fairly brisk bleeding oc curred from the sinus with an estimated blood loss of goo to goo cuble centimeters. He was given a blood transitusion. A skiedan injection of the sinus tract revealed only a small pocket at the site of the aneur yam. It was felt that the hemorrhage probably had come from the versels communicating with the old

aneurysmal sac. An attempt was made to throm bose these vessels by injecting first a solution of 50 per cent glucose and later 5 per cent sodium mor rhuate into the tract. Following this no further hem orrhage occurred. The cavity decreased in size and the patient was discharged on August 22 1944.

On August 36 1044 the patient was readmitted complaining of a swelling under the old thoracotomy wound which later proved to be an abscess. It was feared at first, however that it might be due to further hemorrhage and since he was afebrile it was not incesed He was diskraged on August 27 1044.

On September 4, 1944, the patient was readmitted complaining of increase in the size of the aweiling under the old inclaion and further bleeding from the supraclavicular sinus tract. He had some fever and since there was some clouding of the right upper chest on x ray examination (Fig. 6a) it was decided to explore the mass. On September 7, 1944, the old thoracotomy wound was reopened and a large abscess cavity approximately 8 centimeters in diameter over the apex of the right lung was encountered and drained. The cavity contained a large quantity of thick pus from which nonhemolytic Staphylococcus aureus was cultured. The site at which the ligation had been done could not be visualized but it was possible that a small sinus at the bottom of the cavity communicated with it. The patient was discharged improved on September 11, 1944.

discharged improved on September 11 1944
On September 28 1944, the patient was read
mitted complaining of dyspnea, substernal oppres-

son and increasing hostociness but no further bleeding. Re-examination of the chest by xrsy revealed that the shadow in the right upper chest was still prominent with the placement of the aortic arch it the left it was felt that there might be a further accumulation of pus over the apex and n September 30, 1044 the oll wound was again explored. No pus was found. The patient improved and was decharged on November x tends.

On December 13 1944 the patient wa read mutted complaining I su liden one-to discrete cough ing which had persisted for 13 to 18 hours. If had coughed up 2 cut fulls of blood and had inoticed some bleeding from the emps ema drainage wognd. Bron

cho-coose examination was refused

Physical and xray xaminations (Fig. 6b) revealed some cleaning at the right apex. While in the hospital be coughed up only a small amount of blood tinged sputum. The exact source of his bleeding was unknown. He was rea used and lischarged on December 18, 1044.

On December 22 1044 he returned to the clinic complaining of coughing up blood. His condition wa good and his cough had topped. He was re-

a sured and sent home On January 31 1043 he wa again seen in the out

patient clinic with imilar complaints. All draining sinuses had healed. He was reasoured an I hischarged. On F bruary 12 1045 h returned to the out patient clinic tating that he ha! gotten slong well excent that he had coughed up a large quantity of

blood on a occasion. Ceneral condition the same On April 25 1045 essentis to month after proximal ligation of the innominat artery the patient receiving to the clinic for a check-up. He had been receiving weekly intramuscular injections of bismuth ubushies/lat since January 3 1045. It had no dispines but occasionally coughed up blood tringed puttin. He had no complaints other than diszanisa on I wering his best. He had excellent used further arm but, tasted that in cold seather rush

hand becam cold and till left hand not affected.

On xammati n the aneurysmal ma had completely lisappeared (Fig. 7). The mall sinu in this are a not the old thoracotomy wound had completely

healed. The anterior border of the right sternocleidomastoid muscle was again clearly visible. Th up nor media tinum was slightly widened to per cu ion on the right. The lungs were elear to auscul tati n. Pulsation in the right brachial and radial arteries were faintly perceptible. Pulsations in th. right common carotid and superficial temporal arteries were questionably felt. The blood pressure in the right arm could be heard faintly at 74/60 and 104/74 in the left Examination of the chest by fluoroscopy and Lymography (Fig. 8a b) revealed a large nonpulsating mass in the supracardiac area at the site of the ligation of the innominate artery This mass was interpreted as scar tis u and not as an aneurysmal dilatation. The traches had almost returned to the midline and the diaphragm had

descended and had regained 50 per cent of its motion

#### SUMMARY AND CONCLUSION

A case of syphilitic ancurvam of the innerinnte and common carotid arteries which for appeared after a severe couching spell by been presented. The aneuryam was leased proximally at its functure with the agets be the use of two wide rubber bands. Polisting ceased immediately following lightion although no appreciable decrease in the size of the miss was noted to weakness of the homolateral arm or opposite side was observed. On the fifteenth postoperative day the aneurym lecame fluctuant and was drained to avoid spontaneous runture. Approximately 100 rebic centimeters of our and thrombus were obtained without bemorrhage Follows drainage the mass subsided. Two and mehalf months later hemorrhage occurred from a nersistent sinus tract at the former site of designate. An attempt was made to through hose the feeding vessels by the injection of so per cent dextrose and s per cent soften morrhunte solutions Although these meaures appeared to be effective in stopping the hemorrhage other complications developed He returned a month later with an infection under the old thoracotoms wound which subaided following drainage Subsequently both the persistent supraclavicular sinus and thor acotomy wound healed with complete drappearance of the aneury sm There remains a residual nonpulsating mass at the ute of ligtion which is believed to be scarring resulting from the irritation of the rubber ligature Patient has occasional episodes of coughing productive of blood tinged sputum due perhaps to some involvement of the trached in the cleancial mass. Except for these enisodes the patient states that he feels as well as he ever he

I roximal ligation of a syphilitic anemysts of the innominate artery with rubber beads has resulted in complete disappearance of the aneurysm and clinical cure of the patient.

#### RUFILRUNCES

1 Висск, R. C. Guy Hosp, Rep. Lond 440-44, 6 80-105 GRIDSTOCOM J MES. Arch. Surg. 1939, 19 144-744

GREENOVOR J MFS. Arch. Surg. 1930; 19 LEP-194 3 CUTVARD A. B. IL Soc chile Parts, 0 17 South 4. MOTT VALENTIN Med Serg. Register 188, 1-4 7 RUNDE, JER. E. Brit. J Surg. 037 35 77-195 6. SAROENT P. Lancet, Lond., 911 500.

# FAILURE OF THE UROGENITAL UNION

# ALEC W BADENOCH M.A. M.D., Ch.M., F.R.C.S., Wing Commander R.A.F.V.R.

a fairly extensive search of the liter ature very little reference is found to a failure of union between the vasa effer failure of union between the epididymis entia of the testis and the epididymis Hobda\ mentions that in the horse the cpi didyrus is occasionally found in the inguinal canal while the testicle is in the abdomen Kaufman (1922) and Windholz (1926) men tion complete separation of the epididymis and tests, and Brunzema (1929) found this condition four times in 104 cases of undescended testis. Wilson (1939) records one case in which the testis was in the inguinal canal and the cpldidymis was in the scrotum Om bredanne (19 3) describes the separation as occurring occasionally when there is a vestigual testis and Wangensteen (1932) quotes a case of an epididymis with a vestigial structure attached to it which had none of the appear ance of a testicle

## UROGENITAL UNION

In a 21 millimeter embryo (7th to 8th week) the wolfnan body consists of about 26 tubules situated in the lumbar region and all in a process of degeneration This remnant of the mesonephros is divided into two portionsupper and lower The upper or epigenital part consists of 5 to 12 tubules the blind ends of which become surrounded by the epithelial nucleus, forming in the indifferent reproduc tive gland so that each comes to be in a sort of bay in that part of the nucleus from which the rete tests is formed From the beginning therefore the wolfhan collecting tubules and the tubules of the testicular rete are in intimate contact and he wall to wall The urogenital union takes place when the two open into each other (Fig 1) and this appears to occur at very different periods. Felix saw it first in a 60 millimeter embryo-head foot length

When union has taken place the collecting tubules are known as the vasa efferentia. In the 4th to 5th month they begin to coll at the end nearer the wolffian duct but remain

straight toward the testis. Later, they are surrounded by a firm connective tissue mem brane and become the coni vasculosi All of the 5 to 12 tubules do not necessarily take part in the union but if not, they frequently persist as remnants in the epididymis forming the vasa aberrantia One or two may unite

before joining the rete testis. The lower or paragenital portion of the wolf fian body consists of two or three small tubules closed at both ends and persists as the para didymis

# FAILURE OF UNION

In a series of 42 cases in which patients with incomplete descent of the testis, were operated upon I have seen 3 in which there was no macroscopical union of the testis and epi didymis. In 2 of these the absence of union was confirmed microscopically

Case 1 A wireless air gunner complained of pain in the right groin since beginning to wear parachute harners. On examination the right compartment of the scrotum was empty and he stated that the testis the activiting was empty and he stated that he testing had never been down. The right testide could be felt in the inguinal canal and pressure over it caused ten in the inguinar cause and pressure over it caused the pain of which he complained. The left testicle was well down in the scrotum and it and the epi didymis felt normal No evidence of hernis was noted October 13 1941 under nitrous oxide ges, oxygen and ether anesthesia pentothal induction, the right inguinal canal was opened and the testis was found lying in a patent funicular process, the fundamental states and the sac was opened the testis was seen lying on the floor about 1 inch from the internal abdominal ring (Fig 2) The sac was freed from the floor of the inguinal canal, and the epididymis was found with the globus major almost at the fundus of the processus and completely separated from the body of the testis. The vessels of the spermatic cord were very short and the testis epididymis, and sac were re On microscopic examination the testis showed the usual picture of an undescended organ. The seminiferous tubules were composed of a single layer of cells occasional spermatogonia were present but no spermatozoa. There was no microscopic con nection between the body of the testis and the epi didynis although there appeared to be one or two ducts leading from the upper pole of the testis. The termination of these ducts were not identified

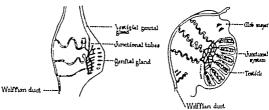


Fig. 1 A diagrammatic representation of the progenital union. (After Krith.)

Attended complaining of occasional swelling, with pain in the right groin for some 12 months. The right testicle had never been in the scrotum. A small oblique right inguinal hernia reaching to the external ring was found the right testicle was not felt. The left testicle was well down in the scrotum and it and the epididymis appeared normal On May 2 1012 under nitrous oxide gas oxygen and ether anesthesia pentothal induction, the right inguinal canal was opened. A small patent processus vaginalis was found. The testis was intra abdominal but the base of the mesorchium was just inside the inguinal canal (Fig. 3) and the testis could be brought into the canal. His attacks of pain may have been due to intermittent prolapse of the testis and strangulation of the cord. The was ran down the canal on the posterior wall of the sac and termi nated in a splayed-out epididymis which had no connection with the body of the testis. The was and epididymis could be brought well down, to reach the bottom of the scrotum, without difficulty but the testis could not on account of the shortness of the vessels of the spermatic cord. The testis enididymis and sac were removed. Microscopically, the picture was similar to that in Case 1

Inguinal ring

Testio

Vos defirens

Fig. s. Failure of descent of the right testis and failure of union with the epididymis.

CASE 3. Attended with a large left sided scrotal bernia which had gradually been increasing over a period of 10 years. The bernia was easily redecide but no testicle was felt after reduction. There was a suggestion of a thickened structure, in the posterior wall of the sac, in the empty scrotum, and a preoperative diagnosis of atrophy of the tests was made. On December 7 1941 under altrons onde gas, oxygen and ether anesthesia, pentotial infac tion, the left inguinal canal was opened. A large patent funicular process was found. When the sec was opened, the testis was seen lying on the for (Fig. 4) half an inch from the inguinal ring, and bound to the sac by adhesions. The vas passed days to the scrotum and terminated in a splayed out qu didymis. This had no macroscopic connection with the testis. The funicular process was divided prodmal to the latter and cleared from the cord and epdidymis. The testis was then easily mobilized and brought into the right scrotal compartment. The floor of the canal was repaired with a strip of faces

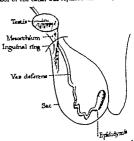


Fig. 3 An Intra-abdominal right testis and taker of union with the epididymis.

# BADENOCH FAILURE OF UROGENITAL

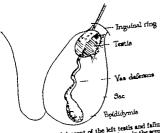


Fig. 4 Failure of descent of the left testis and failure of mion with the epidedymia which is well down in the scrottm.

taken from the aponeurosis of the external oblique

These 3 cases would undoubtedly appear to illustrate failure of the urogenital union Dur ing the past 3 years I have almost invariably included an examination of the testis on each male patient who has been referred to me I have not observed anything which would sug gest complete failure of union in a normally descended testis and it is probable that this occurs only in association with incomplete descent However I have been struck by the comparative frequency of the occurrence in young adults, of a small cyst in the region of the mediastinum testis, and believe that not infrequently this is due to a partial failure of the urogenital union

Ogier Ward (1922) reported 17 cases of spermatocele and described the etiology The youngest of these patients was 41 years and the average age was 55 years. He considers it as a disease of maturity and that a spermatocele is a retention cyat of unknown pathology Dorne (1926) reviews the literature on the subject and also considers that the condition is a retention cyst. Among the etiological factors, he mentions trauma, gonorrhea, or any previous inflammatory process Rolnick (1928) in the routine examination of 55 000 men for spermatocele found a clinical incidence of 1 per cent. He operated on 12 patients and found that it was possible to dissect out the cyst in only one case which was shown to have been formed from a distended tubule. He attempted to produce true spermatocele

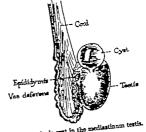


Fig. 5 A single cyst in the mediastinum testis.

in 28 dogs and failed in each case. McCrea (1935) gives the following classification of cysts in relation to the epididymis (a) cystic disease of the epididymis (b) cysts developing between the testis and the head of the epi didymis, (c) cysts of vestigual structures near to or attached to the epididymis. His view is that (a) and (b) arise from obstruction but that obstruction does not necessarily result in cyst formation. He quotes Kocher and Monod and Terrillon as having described dila tation of the ductuh efferentes and considers this to be the cause of or a later step in, the dilatation of the epididymis He considers multiple cysts to be more common and more common in the epididymis than anywhere else He also considers that (a) and (b) are retention cysts resulting from obstruction.

In the past 3 years I have seen some 12 cases of single cyst formation in the region of the mediastinum testis occurring in men under the age of 25 years. A colleague aged 43, has had one since puberty The large majority of patients were quite unaware of any abnormality and in most cases no com ment was made on it. (It is rather extraordinary how many cases of large scrotal hernia of which the patient is quite unaware are discovered at routine medical examination.) These cysts vary in size from that of a pea to a hazel nut. They give use to no symptoms or disability and therefore the opportunity for surgical intervention—certainly in the Service -is rare In those that have been aspirated the fluid has contained scanty spermatozoa. I believe that these cysts form where there has been a partial failure of the urogenital union just after the commencement of spermatogenesis.

CARE 4. Presented himself with a left inguinal bernia On examination a cystic swelling the size of a small nut was found in the region of the mediastinum of the right testis. Aged 24 he was upaware of this and therefore had no idea as to how long it had been present. At operation after the hernia had been repaired an incision was made in the right scrotum and the cyst was found lying against the epididymis, deep to the tunica vaginalis (Fig. 5) It was rather pear-shaped with the narrow or tailend toward the testis. In the cyst fluid were scanty faintly motile spermatozoa. The cyst appeared to be a distended vas efferens

I have noticed that occasionally after endidymectomy a cystic swelling forms in the region of the mediastinum testis. It makes its appearance within a few weeks of the oper ation and may grow to the size of a hazel nut. In 2 such cases in the last 18 months scanty spermatozoa were found in aspirated fluid After aspiration the cvat refilled within a few days. It has all the characteristics of a sper matocele and has occurred when there is a complete absence of union between the testis and the collecting system.

#### SUMPLARY AND CONCLUSION

Fallure of the urogenital union has received only scanty attention in medical literature and very few cases have been described. Three cases of complete failure of union occurring in a series of 42 adults operated upon with a complete descent of the tests are now re ported. It is thought that complete fallure of union occurs only in association with indecended testis. Incomplete failure of union is put forward as a suggested cause for the or currence of single mediastinal cysts in your adults.

#### REFERENCES

- I BRUNCERMA Arch. klin. Chir 989, 54 754 z. Domez, M. J. Urol., Balt., 926, 5: 389. 3. Frank, W. Keibel and Mall's Human Embrysing.
- 10 1.
- 4. Houndy F T G Castration and Oracletony Ele-burgh W & A. K. Johnston, 1914. 5. KAUPMAN Quoded by Brangana, loc. ch. 6. KPTM, Str. Arraus. Bilt. J Serp., 924, 1 7. McChra, E. D. Bilt. J Urol., 1915, 7 8. Characterist, L. Calcurgie Infandle. Park Massa.

- et Cle., 933.

  9. ROLDONE, H. C. J. Urol., Balk., 938, 9.6 ;

  9. Wandelstein, O. H. Surg. Gyn. Olm., 1973, 54
- 11 WARD, R. OGIRE, Lancet, Lond., 1922, 807
  11 WARDON, D. S. P. Proc. R. Soc. M., 1935, 37 959
  13 Windmotz. Chirargie des hodem und des Saus-stranges. Aree Bentietin Chirargia, p. 46 Suchpart. Enke, 1026.

# PRELIMINARY REPORT OF A METHOD FOR THE PRE-VENTION OF LEAKAGE OF INTESTINAL ANASTOMOSES An Experimental Study

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THE methods herein described were evolved for colon anastomoses but are applic able to all other gastrointestinal anastomoses, including small bowel anastomoses, gastroenterostomes and dosure of the

It was noticed both in the postmortem depart duodenal stump ment and in instances in which experimental sutures had been put into redundant exteriorized colon (when it was brought out of the abdominal wall after the operation of excusion of the rectum) that each particular suture hole became infected and therefore a potential source of sepsis or leak age. Thus sutured anastomosus of the colon must always have an element of risk, and although with the bringing of pentoneum to pentoneum with silk sutures which traverse only peritoneum (where this is present) the risk is minimized its dangers in any but the most experienced hands has led in many cases, to the adoption of Paul Mikultez procedures followed by nonsuture anasaseptic anastomoss techniques, and many other methods. It tomosis with a crushing clamp has been long recognized that the most important sutures are those that bring peritoneum to peri toneum and in some methods of anastomosis no attempt is made at mucosal appoation by suture Another method of nonsuture anastomosus is the Murphy button This method gave safe anastomoses of the small bowel with pentoneum to pentoneum junction without su tures (where the bowel is covered by peritoneum) although the button is seldom used these days. Anastomoses in parts of the bowel not completely invested by peritoneum are most difficult to accomplish successfully by any method

The problem of suturing the large intestine can be considered to be comparable to suturing the inner tube of a motor tire. Here sutures cannot be employed to repair rents because each stitch put into the rubber tube would leak air therefore punctures in tires are mended by 'vulcanizing on patches over the holes.

The method herein described involves the 'vulcanizing on" of peritoneal grafts or split skin From the Physiological Department, University of Melbourne.

grafts over the suture line, whether or not the sur face is covered by peritoneum. It is a procedure supplemental to the usual methods of anastomosis. It takes very little more time and there is nothing to lose if it fails.

## METHOD EMPLOYED

In 1943 Sano reported a method of 'sticking on skin grafts using dried plasma and leucocyte cream the graft was placed in contact with the recipient area without sutures. Adhesion occurred in a few minutes. In 48 hours the graft had a blood supply and was completely fixed in 4 days. Young and Favata in 1944 further simplified this procedure using thrombin solution on the unwashed skin graft, and normal pooled plasma on the recapient area This method has been used successfully by the author in applying akin grafts cut with the dermatome, thus avoiding the necessity of sutur ing the graft in position and of applying pressure. Further work by Cannady (1943) had shown that strips of skin were useful in repairing a hernia and that no harm came from dermis in the tissues.

An experimental study was therefore under taken to see whether skin or peritoneum could be grafted over the suture line of colon anastomoses on the assumption that any method which would be successful in the colon would be at least equally successful in the small bowel and stomach. The method of fibrin fixation of a graft to bowel would be physiologically sound as after all the normal formation of intra abdominal adhesions must occur by that method Fibrin fixation of skin grafts was an established fact and had been personally found useful. However it remained to be seen whether pentoneum would receive peritoneal grafts whether intracolonic pressure would 'blow off grafts whether soiling and consequent sepsis would prevent the graft from taking whether such a convenient strong grafting ma tenal as skin or split skin could be used in the peritoneal cavity

## EXPERIMENTAL PROCEDURES

Dogs were used in the experiments because they have a strongly mobile small colon which



Fig Experiment Showing most of free omental graft still sticking t the suture line.

makes surgical procedures difficult and are susceptible to general peritonitis therefore, it followed, that they were suitable for testing the efficacy of the graft. Ten small dogs were used

#### TABLE I - PROTOCOL

Group A. No pressure of any kind applied,

Expen ment	T pe of grad	Remb	State of graft	Secling of penta-
	Free emental	Death hes	Half graft adherent	+++
	graf on settare line (perstancal graf stuck well on gwt)	Death #4 kre		++++
	Perstenens	Death hes	Adherent except at mesenteric border	++
•	W bein thickness skup	Death 16 km	Well adherent encept at magneteric barder	+

Group B. Free perstances grafts held in position for about a painting with pressure

	Pentousus	All ye (kalbed (the da )	Adherent	MI
7	Perriondula	Alive (kiBed (th day)	Adherent	ME
•	Perstoneum with	Death 7 km	Graft fully adherent leak had accurred through the belo	++
	Pentaneum	Death 48 hrs	Adherest	NI
	Pentescum	Allva (kulled din day)	Adberest	Nil

Group C Exteriorized colon.

Whole thickness skin and peri- toneum	Both adhered and remarked adherent	

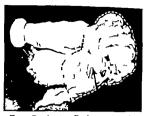


Fig. 2. Experiment 2. Showing omeutum stack experitoneal graft which was also firmly stuck in position

in the first 6 differing trial techniques were used. and in the succeeding 4 at a later date a more or less standardized technique was followed. In all cases the ascending colon was cut across between rubber bowel clamps to stop undue fecal contaminstion, and then the ends were joined together by a single continuous through-and through alk sutare which went through all bowel wall hvers at once and encircled the bowel and was ned only when it came back to the place from which it started This admittedly inadequate method of anstomosas was not assisted by the use of either a Miller Abbott tube or an artificial anus to take tension off the suture line. In some cases ieces could be observed to issue from the ineffective suture line immediately after the removal of the clamps, and in the control experiment in which this suture was used alone, death occurred wither 24 hours, and it was found that the abdominal cavity was full of feces. It will thus be seen that the greatest possible strain was thrown on the grafts in testing their efficacy in the prevention of leakage of intestinal contents.

#### RESULTS

In the first 6 experiments various procedure were used but in only 1 case (Table 1) was the grift applied with pressure. This dog fixed and was killed at the end of a week, when the gut was found stacking firmly in position without ay sign of leakage or peritonitis. (In the dog is which no graft of any sort was used, desthocaured within 24 hours with feess being widespread throughout the peritoneal cavity in the remainder in which whole thickness akin, perioneum and omental grafts were used, all ore found to be firmly stuck on to the anastomess despite the fact that pressure during application had



Fg 3 Experiment 5 Showing skin adherent to suture hoe with 'no pres

not been used but in these cases (with 'no pressure technique) leakage had occurred at one spot or another usually at the mesentenc border

In the second series of 4 cases, peritoneal grafts only were applied with pressure for about 5 min utes. No sutures of any sort were used to fix or to hold the grafts in position in these 4 cases 2 were alive and perfectly well at the end of 6 days, and when they were killed no pentonitis was found In each of these cases the graft was strongly fixed in position In one other case death occurred in 48 hours from a general hemorrhage through out the peritoneal cavity no peritonitis being present and no bowel leakage having occurred and the graft was still firmly fixed in position The fourth died after 72 hours with general peri tonitis. The graft in this dog was accidentally perforated in cutting but it was applied with the hole over the suture line just to see what would happen This graft was stuck firmly in position and could not be pulled off the bowel but feces leaked through the hole in the graft (Fig. 5)

Thus all 5 peritoneal grafts which had been applied with pressure stuck firmly in position and of these 2 dogs died 1 from hemorrhage and a from leakage through a hole in the peritoneal of graft made while it was beang taken (Fig. 5) of graft made while it was beang taken (Fig. 5) die of grafts were found adherent at least in part In grafts were found adherent at least in part In the experiment in which no graft had been applied to the suture line a peritoneal graft applied to the colon elsewhere was firmly adherent.

The application of these findings to the human was first done on exteriorized redundant bowel left outside the abdominal cavity after the operation for exclaim of the rectum A graft of whole thickness skin and a graft of pentoneum were both taken at the time of operation and refrigerated taken at the time of operation to the exteriorized for 6 hours before application to the exteriorized



Fig 4. Experiment 7 Showing peritonesi graft stuck firmly in position.

colon on its peritoneal aspect, plasma being applied to the bowel and a few drops of thrombin solution to the graft ressure was applied for 4 solution to the graft adhered readily. They were firmly fixed in 24 hours and by the third day firmly fixed in 24 hours and by the third day the appeared to have a blood supply and by the fourth day the edges could not be lifted. The fourth day the edges could not be lifted. The fixation was easier than with dog plasma band as much more sticky than dog plasma and of course human bowel and skin and pentioneum are much larger and easier to handle pentioneum are finly dog peritoneum and small dog to colon which had presented many technical difficulties in the spreading of the graft.



Fig. 5. Experiment 8. Showing edematous peritorical graft struck firmly in position with arrow pointing to hole in the graft through which solling of the peritorical cavity had occurred.



Fig. 6. Experiment o Showing mass of omentum adhering to peritoseal graft such was family fixed in position.

Observation of the grafts in the dogs and man shows that they adhere with a reasonable tenacity immediately that by 48 hours they are quite firmly adherent and that at the end of a week they could not be pulled off. After 48 hours the grafts appeared to be edematous and to stay so for some days.

It is reasonable to suggest therefore, that the employment of these grafts in intestinal anastomoses in man will be of great value and may obviate the use of staged operations now commonly performed in order to avoid the risk of leakage from the nuture line.

#### PROTOCOL OF EXPERIMENTS

In all cases a right upper paramedian abdominal incusion was made and the ascending color cut across about 4 inches from the occum. The ends were then joined together with a continuous silk





Fig. 8 Clamps used by author



Fig. 7. Human. Peritoneal and ski grafts applied to externorized human box 1. A points to the skin and 3 to the peritoneum. (Photograph taken on fourth day)

suture starting on the meanetern border and traversing all coats and being tied again or ruin to the meaneteric border Chloroform anestheu was used throughout. The first 6 expenients were done on August 26, 1945 and the second 4 on September 7 1945 Small dogs were sed

#### Gress A

E periment! A fire graft cut from he prater constant was awabled with large amount of through sensite made by dissolving 5000 units 1 5 order extinserior sitiles. The surface line is finished this day placed to lated) taken from single dog 5 days before. The pratiial dever the bows into all less surfaces the pratital dever the bows into all less surfaces to some the surface of the surface of the pratition of the realized pertuculties, and only half of the pratit as sensit is be still adherent the senter the.

to eath agenerative we solver the extra primary about half an inch wide was wroped moud be bord an orientered with little throads better the extra primary and the grait as found to a fall and well and sa stilled by othercitors as the extra primary and the extra pr

selejhlorhood of the anastoroosis. E periment 3. N. graft or throubin as sed 4. P. periment 3. N. graft or throubin as sed 4. P. postage-stamp size of peritosecum was cut and sprifel when eccum after having been available in the throubin size the eccum with plasma. It stock on well and a least the still struck on after death. Then of death at 31 least At postmoeters the peritosocal cavity as feared 1 left. Of feeces.

of feces.

\*\*Experiment 4. A strip of anterior peritoneum abset like an loch wide was bandaged around the assistances. The graft was first dried and then just moistered this theorem bias. Plenty of plasma was put on the bowd likeli, set as

### DEVINE pressure was applied. Time of deals at about 14 hours. generalized peritohitic reaction and scaling of the peri-

toteal cavity were present, and there was a leakage from toness cavity were present and the meanteric border where the graft was not stuck on. For the remaining circumference of the bowel the graft was

1

Experiment 5. A supp of whole thickness skin about half an loch wide was meistened with a few drops of thrombin and hot with a bandage round the bowel. The ends did and applied like a bandage round the bowel. firmly stuck on. not meet very nicely round the mesenteric border. No Presente was applied. A patch of submucosa was moistened with thrombin and applied to the bowel on which plasma and unremore and appared to the lower on which passing had been put about an inch from the line of the anastomods. Time of drule at about 36 hours. At postmortem there was a sight peritonitis present. The graft had stuck on well but there was a leak at the mesenteric border. The on wen one there was a reas at the increment of our submucosal graft was well adherent to the bowel.

Experiment 6 A free omental graft about a inches by an inch was dried and a small amount of thrombin solution applied and then It was wrapped around the bowel on the anners are their to was wispped around the none of the site of the anastomosis—no pressure being applied. There are or the anastomosas—no pressure using appear 1 see of death—at about 24 hours. Some of the graft had not adhered. No definite leakage could be found.

Experiment 7 A graft of peritoneum plus muscle about three-quarters of an inch wide and an inch and a half long reservabled with 3 or 4 drops of thrombin solution on its was awanoeu with 3 or 4 drops or unument sounder or re-peritorical side which was then applied to the line of anasperiories and which was then applied to the tipe to anisation tomosis which had been swabbed with plasma. The graft tourness which has been expended with pressure, are good was present into position by two charms for a minutes. It such well on to the flattened bowel. Trace of deals—this strick well on to the flattened bowel. sticks well on to the natural number of the sixth day when it was killed Parimoriem raport - a wound abscess was present but there was no peritoultis and the graft had stuck on well and surrounding small bowel had also adhered to one side

Experiment 8 A strip of peritoneum half an inch wide and a inches long which had a hole in the middle of it (made of the graft. on taking it from the abdominal wall) was applied to the bowel on which plasma had been awabbed after having been out which plasma had been swapped after having been moltimed with 3 or 4 drops of thrombin solution. It was beld in position with two clamps and on removing the clamps after 5 minutes the graft had stock on well to the cramps siter 5 minutes the grait and stoke on wen to define fattened bowel. Time of death—about 72 hours. Post mortem report—there was a general pentonius present. The morress report—uners was a general personnia practice. The graft had still stuck firmly in position and could not pulled off but through the bole in the center of the graft eres had contaminated the pertuneal cavity

feets had contaminated the pertuneal cavity

Experiment p. A strip of perfuneum half an inch wide

and a inches long was moistened with thrombin and held over the sature line with a pressure clamp for 5 minutes.

Time of death-48 hours. tensive bemorrhage into the peritoneal cavity but with no control periamentage into the periture at cavity out with no confidence of the periture at the graft was still firmly in confidence of the periture of the per

Position or peritoritis, and the grait was some many as position with no leakage apparent.

Description with no leakage apparent in the position of the strip of bin and the bowel having been swabbed with plasma. It was clamped on for 5 minutes with a present clamp, and stuck on well. Then thrombin solution was swabbed on t some of the greater orientum and plasma was put over the house is the Ricator officeround and passing was part over the Then the omentum was a rapped loosely round the anatoand the television was nietped massly today are anatomore area. Time of deals—dog was very well and frisky monts area. (1986 s) acous—top was very well acoustions, and was killed on the sixth day. Postmeries report—no

peritoritis was present and the omentum was wrapped pernomus was exemit and the onemium was wrappen irremovably around the grafted bowel and the graft was

The possible human applications of these find also firmly freed in position. ings ou dogs and the human bowel are that with the usual methods of anastomosis as used in either gastroenterostomy operations on the esophagus, gastrectomy closure of the duodenal stump and small or large bowel anastomoses, the suture line can be very rapidly reinforced by a strip of antenor peritoneum sufficient to go round the bowel and with a little to spare and about three-quar ters to an inch in width This would be moistened, with a few drops of a solution of 5000 units of thrombin in 5 cubic centimeters of saline and applied to the suture line which has been swabbed with pooled human plasma, most conveniently obtained from a blood bank. Both these solu tions keep a long while in the refingerator and indefinitely in the desiccated form. This procedure could be done whether or not there is pertoneum on the suture line Pressure would then be applied for 5 minutes by medium of some such type of clamp as used by the author (Fig 8) and then the intestines would be carefully returned to the abdominal cavity if handled roughly in its early stages, the graft may be rubbed off before becoming firm As a further precaution and where anatomically possible omentum could be moistened with thrombin and applied to graft and bowel which has been painted with plasma. This will then adhere and form artificial adhesions as was shown in experiments 10 and 2. Thus a rapid and easy means of omental reinforcement of suture lines is available Further for some time it has been the practice of the author before suturing to moisten with thrombin solution one side of intestines being anastomosed and the other side with plasma solution Thus the normal scal ing and repair of bowel are speeded up during the few important hours when the bowel is quiescent following laparotomy

# BUMMARY AND CONCLUSIONS

The theoretical basis of a quick, easy method of increasing the safety and scope of a gastrointesti nal tract anastomosis is described. Experimental results in dogs and application in a human being are brought forward in support of this method

#### REFERENCES

CANMADY J. E. Am., J. Surk. 1943, 59 409.
SARO, M. L. Surk. Gyn., Obst. 1944, 77 510-513.
YOUNG, F. and FAVATA, D. V. Surkty 1944 15 378

# UTILIZATION OF HENLES LIGAMENT ILIOPUBIC TRACT APONEUROSIS TRANSVERSUS ABDOMINIS AND COOPERS LIGAMENT IN INGUINAL HERNIORRHAPHY

#### A Report of 162 Consecutive Cases

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November of 1943 because of the urgent need for replacements in the Army it was decaded to induct those men who previously had been deferred because of inguinal hernias. The Station Hospital, Fort Douglas, Utah was called upon to rehabilitate many of these men as it is adjacent to a reception center and it seemed advisable to keep them near home until they could undertake basic training

To plan an operative technique that would make recurrence under the strain of training and combat less likely we decided to review available hospital operative records on recurrent hemias to determine the point at which they had broken through the abdomnal wall. It was found that 75 per cent had recurred as direct hernias superior to the pube tubercle, and posterior to the external abdominal inguinal ring [Fig. 3]. The remainder had occurred as indurect hemias probably from incomplete obliteration of the sac.

Many of the standard methods of repair of inguinal hermas have employed the principle of suturing the conjouned tendon to the inguinal ligament to reinforce the posterior wall of the inguinal canal. Surprisingly little attention has been paid to the utilization of other tough tissues that exist in this area namely the strengthening fibers in the transversalis factor.

McVay and Anson have recently called attention to the anatomy of the Ingunal region and have reanalyzed the structures in that area. They have found considerable variation between their careful dissections and the descriptions ordinarily occurring in standard textbooks, particularly with reference to the transversalls fascua and the conjoined tendon.

#### TRANSVERSALIS FASCIA

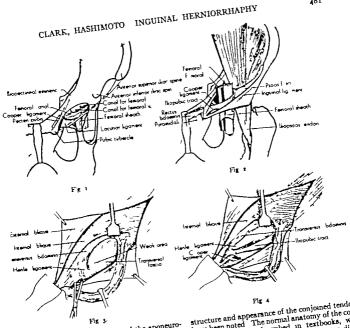
Most texts inadequately describe the transversalis fascia as a structure lining the inner sur

From the Department of Anatomy University of Utah School of Medicine, Salt Lak City and the Station Hospital Fort Douglas, Utah

face of the abdominal musculature (Fig. 3) In our dissections of the inguinal area we found that the transversalis fascla consists of three promines fibrous structures with intervening connective structures with intervening connective fibrous structures with intervening connective fitsure. These three fibrous remiforements of the transversalis fascia are the fliopuble tract, finds ligament, and the aponeurosis of the transversal addominists. For a more detailed description of the anatomy, the work of McV ay and Amon should be consolited.

Riopubic tract The transversals facts is directly continued into the thigh as a part of the femoral sheath. When this fascia is dimerted from the inguinal ligament, care being taken at to open the fascus there is a band of fibers pand leling the inguinal beament and demarcating the abdominal component of the fascia from that of the thigh It can be palpated as a tough, fibrost structure posterior to and separate from the inguinal ligament and cannot be seen unless a s separated from that ligament (Fig 4) The tast is best seen anatomically by severing and retracting the inguinal ligament (Fig. s) It a d considerable strength passes inferior to the internal abdominal inguinal ring and may be traced from the illopsons (paces) fascus in the area of the anterior inferior lilac spine to the public tubercle (Figs. 1 2) Medially blending with Henle's ligament, the aponeurosis of the transversus abdomins and other less promises portions of the transversalis fascia, the fibers of this tract insert into the pubic tubercle and Cooper a ligament (Figs. 5, 6) This band of fibers of the transversalis fascia, the illopate tract, has always been present and was comidentified It is a separate structure from the agumal ligament.

Heales i spaces! Without entering his are historical controversy concerning Heale's Epment (McVs) et al.) we found in all of our desections a definite fibrous structure, which seems to be derived in part from the lowermost ports of the lateral border of the rectus sheath, and is



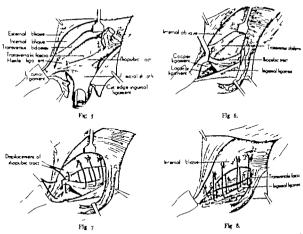
part from the lowermost extent of the aponeurosus of the transversus abdominis (Fig. 3) Fan ning out interolaterally it intermingled intimately with the fibers of the lhopuble tract (Fig This is the structure originally described Henle

Aponeurosis of the transversus abdominis The lowermost fibers of insertion of the transversus abdominis muscle are aponeurotic and appear as a flat band paralleling the lateral border of the rectus sheath (Figs. 3 5) Superiorly some of the fibers pass anterior to the rectus abdominis muscle and form part of the anterior wall of the rectus sheath while interiori) some pass down to blend with Henle's ligament The major portion of these fibers, however insert into the pecten of the publs (Fig 6)

## CONJUDINED TENDON

In our experience both in the dissecting room and the operating room wide variations in the

structure and appearance of the conjoined tendon have been noted The normal anatomy of the con joined tendon as described in textbooks, was frequently observed although often it was diffi cult to differentiate the conjoined tendon from the lateral border of the rectus sheath cally the conjoined tendon is described as a com mon tendon of those fibers of the internal oblique and transversus abdominis muscles which form an arch over the spermatic cord (round ligament in the female) and insert into the pubic tubercle and the pecten of the publs. More careful analysis of our dissections show that this so-called tendon is composed of two sheets of tissue representing those portions of the aponeurosis of insertion of the internal oblique and transversus abdominis muscles lying anterior and in small part lateral to the rectus abdominis muscle insertion These two aponeuroses are not a fused tendon as usually described but two distinctly separable aponeu-TOSCS.



Some of our past difficulties in explaining the conjoined tendon to ourselves and to the discern. ing student lay in the fact that the aponeurotic insertion of the internal oblique falled to reach the pubic tubercle or the pecten of the pubis, but inserted into the anterior rectus sheath interdigitating with fibers of its fellow several centimeters above the usual point of insertion Moreover in some dissections it was found that the aponeurotic insertion of the transversus abdomin's was into the lateral wall of the rectus sheath as described by Robins. These abnormal insertions of the internal oblique and transversus abdominus muscles leave a weakened area superior to the pubic tubercle and posterior to the external abdominal inguinal ring (Fig. 3) the site of most recurrent hernias (Babcock, and Robins) The only structure present in many of these dissections reinforcing this area was a weakened transversalis fascin

#### COOPER S LIGALIENT

In addition to the structures described another important ligament exists, which extends from the public tubercle along the pecten of the publis and continues posteriori) along the libocritical line at an angle of approximately 30 degrees to the inguinal ligament (Figs. 1). It disappears are the Iliopectineal eminence by blending with the periosteum of the bone, and is minutely scheen to the bone in its entire extent. Because of a strength and position it would seem only ight that it must have considerable importance. In are attached from below upward the period fascin the lacunar ligament, the apocenor thuckening of the transversus abdominis, Heak's ligament and the remaining less distinct portion of the transversals fascia (Figs. 5, 6)

In the Iraniversation in the Court of the Iraniversation and Swemson have reviewed the literature and pointed out that the saturage of the Iraniversation fascial and attached streams of Cooper's ligament was not new Such men as Cooper's ligament was not new North of Cooper (1921). Stetten (1923), Andrew (1924). Keynes (1927) Sketten (1923), Andrew (1924). Keynes (1927) Pakkond (1927) Dekkond (1924). McClure and Fallis (1923) Amendoli (1924). Newboft (1924) and Harkins et al. (1924) have used this structure, and been satisfied with a importance in the repair of hernias of the repea

#### THE REPAIR

The technique presented herein has been deloped and tested on 162 inguinal hernlas of all pes. To date there have been no recurrences. t the time this work was started we were not

Unless contraindicated all of our hermorrha hies are done under spinal anesthesia. Regard ess of the type of hernia to be repaired a skin ncision is made as originally described by Bassin clamping the superficial vessels before they are severed. The aponeurosis of the external oblique is cleaned of all fat and arcolar tissue by sharp dissection, and a small incision is made in the direction of the fibers of the external oblique, near the upper margin of the wound The incinion is carefully enlarged with scassors until the illoinguinal nerve is exposed and dissected free, and the ilhohypognstric nerve is identified (Damage to these nerves may result in an annoying skin anesthesia and a loss of tone of the internal oblique and transversus abdominis muscles favoring a recurrence of the hernia.)

The incision is then extended down through the external ring and with a moist gauze sponge, the aponeurosis is cleaned down to its insertion. The pubic tubercle is clearly identified and all areolar tissue is cleaned from it with a sponge The sheath of the cremaster muscle is not opened but is detached from the inguinal ligament with a most sponge. After the cord has been mobilized, it is held with an Allis forcep if small or with a rubber tape if large enough to be constricted by

The indirect sac is identified and picked up at the anteromedial surface of the cord It is incised an Allis. and freed from the surrounding structures by carried out through the incision in the indirect sharp and blunt dissection ac for a direct sac, and if one is found it is transposed lateral to the epigastric vessels, converting both sacs into one (Hoguet) It is necessary to identify the micrior epigastric vessels and to separate some prepentoneal fat from the indirect sac and to visualize and dissect the bladder away from a large direct sac before dissection of the sac is complete. Failure to do so may result in a recurrence of the hernia The sac is closed with a pursestring suture and usually transfixed under the transversalis fascia and internal oblique muscle although this step may not be necessary if the sac dissection is complete.

In order to avoid subsequent confusion in the identification of the structures used in the repeir the internal abdominal oblique muscle is identi fied and held with an Allis forcep This step

avoids later inadvertent suture of the muscle and its aponeurous to the deeper structures

Next Cooper a ligament is palpated as a tough, ndge-like band extending from the pubic tubercle along the sliopectineal line (Figs. 1 2) The transversalis fascia is then separated from the inguinal ligament and the underlying lacunar ligament in the area adjacent to the pubic tu bercle by means of a small straight forceps (Fig. 3) and the anterior 2 centimeters of Cooper's ligament exposed (Fig 4) Unless this separation is carried out close to the pubic tubercle the transversalis fascia will be entered and preperi toneal fat encountered, so as to interfere with

subsequent suture (Trowbridge) Further digital separation of the transversalis fascia from the inguinal ligament exposes a tough fibrous structure the iliopubic tract and the underlying femoral sheath (Figs. 4, 5 0) By clearly exposing the iliopuble tract and mobilizing the femoral sheath a procedure not previously described in the literature, we avoid accidental injury to the femoral vein or artery (Figs. 2 5)

Gallie transplants of fascin lata, obtained with a Masson fascia stripper are preferred to any other suture material for recurrent direct and acrotal indirect hernias. When fascia lata is used the first strip (1 centimeter wide and 15 to 20 centimeters long) is anchored into the periosteum and tough structures overlying the pubic tubercle (Fig 7) From this point a continuous running fascial suture is used. Henle's ligament is then brought down to Cooper's ligament. Next the Gallie needle is passed successively through Henle's ligament Cooper's ligament and the medial portion of the illopubic tract closing the weakened area in the transversalis fascia, the site of most recurrent hermas. At the same time, the lliopubic tract is displaced shortened and drawn diagonally across the area occupied by the femoral canal, to close the canal (Figs. 1 2 3 7) This procedure is technically less difficult than sutur ing the aponeurous of the transversus abdominis to Cooper a ligament in the relatively maccessible region of the femoral vein (McVa) 1942) and per mits clear visualization of all structures used in the repair The suture is continued (Fig 7) attaching the lowermost margin of the aponeu rosts of the transversus abdominis to the iliopubic tract, folding under and obliterating the rela tively weaker areas of the transversalis fascia When the internal abdominal inguinal ring is reached it may be closed tightly without en dangering circulation of the cord. The end of the fasdal strip is then anchored with interrupted No 40 cotton sutures.

The same technique is employed in less difficult repairs with interrupted No 20 cotton autures.

This repair of the transversalis fascia and its reinforcing structures produces a strong berrier to recurrence of hernias. While there may be no necessity for further repair of overlying structures (McVav et al ) on the other hand. In most cases it is a very simple procedure to suture the lowermost marron of the internal abdominal oblime muscle and its aponeurosis to the inguinal ligament, by means of a feared strip or interrupted No 20 cotton sutures, after the method of Bassini (Fig. 8) We do not heritate to use muscle for this second layer when the anoneurosis is deficient. Dissections of recurrent bernias have convinced us that the colmysium of the muscle will become firmly adherent to the ingrunal ligament. Occasionally it is found that the anomalous aponeurotic insertion of the internal abdominal oblique muscle cannot be easily approximated to the inquinal brament. In that event a relaxing incision in the rectus sheath is made (Rienhoff) and the fascia overlying the nymmydalis muscle, the lateral border of the rectus sheath, and available fibers of the internal abdominal oblique and its anoneurosis are then sutured to the shelving margin of the inguinal ligament. Either method of suture produces an additional atmng barner and although we feel that the second layer is the least important of the two nevertheless, the Bassini operation has cured many thousands of cases. Therefore, we have used this additional precaution.

The aponeurosis of the external oblique is repaired loosely over the spermatic cord, and the external inguinal ring is not made unduly small. We do not believe that the aponeurous of the ex ternal oblique can be of much significance as a barrier to recurrent hernias, once the posterior wall of the inguinal canal has broken down

#### STIMMARY

With certain anatomical facts as a basis for a rational reconstruction of an maumal hernia, the described operation was devised. It completely closes the weak area superior to the pubic tubercle and posterior to the external abdominal inguinal ring. The salient features are

I By separating the loosely attached transversalls fascia from the inguinal and lacunar ligaments at their most inferior portion (close to the pubic tubercle) and stripping the fascia from the ligaments, a strong band of fibers is exposed the illopubic tract (Figs. 3 4, 6)

2 As an initial step Henle's Brament rel adjacent portions of the aponeurosis of the tree versus abdominis are sutured to Cooper a firement along its anterior one-third, an available arrive of approximately 2 centimeters. This results is no undue tension, whereas, suringer these state tures to the entire length of the ligament, namely back to the area of the femoral vein, does reach a definite tension and requires a relaxing inches in the rectus sheath

3. The weak area of the transversely freely is further strengthened by attachmy the transposus abdominis anoneurous to the illombic text as far as the internal abdominal incumal rise (Fig. 7) This produces a strong pleat of transversalis fascia and raises and displaces the liepublic tract closing the former defect (Fig. 7) At the same time this step produces a tight intered abdommal rung and closes the femoral caral.

A second barrier may be constructed by suturing the aponeurotic lower fibers of the inter nal oblique muscle to the ingumal ligament the the method of Bassini. If this aponeurous short be deficient, a suture in the rectus sheath or in the aponeurosis of the transversus abdomins is take, medial to that described in paragraph 3, and the layer sutured to the ingumal houment. Rarely s a relaxing incision in the rectus sheath required

5 The aponeurosis of the external oblique a repaired loosely over the spermatic cord, and the external abdominal inguinal ring is not made

unduly small.

6 Strips of fascia lata have been found to be the most suitable suture material for the repair of recurrent, direct, and large scrotal indicat hernias

#### REFERENCES

 Addron B. J., and McVay C. B. Serg Gya Olst, 1935, 66 85-91.
 BARCOCK, W. WATRE. Sorg. Gya. Olst. 440. 45 544-540.
3. GATTIE, W. E., and L.E. MINISTERIE, A. B. CERRÉ, A. B. 19 1, 11; 501-5 1.
4. HARKERS, H. H., and SPERMEN, S. A. Serl, Ca. X.

4 HARTING, H. H., and OBERERG, S. A. Google America, Oct. 3 1 707-187.
5 HARTING, H. H., STILLOTT, D. E., BRIFER, R. E. off WHILLOME, R. SERFEY 1948, I. '964-177.
6 HOUTEY J. D. Ann. Sorg., 1980, 21 67-674.
7 MCVAY C. B. Ann. Sorg., 1980, 21 67-674.
MCVAY C. B., and AFRON, B. J. Ann. Em., 1981.

76 213 23.

9. Ilbid., 1940, 77 213 235.

1. Ilbid., 1940, 77 213 235.

1. REDGEOFF, W. F. Sergery 449 2 32 39.

12. ROBING, C. R. Ann. Sorg. 411 11 2 32.

13. TROWNERIOR, J. E. Personal communication.

# EARLY POSTOPERATIVE RISING

# A Statistical Study of Hospital Complications

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THERE has recently been a revival of in terest in early postoperative rising and walking In June 1942 a critical study of early postoperative ambulation was undertaken at the Peter Bent Brigham Hospital. The preliminary results of these studies are the

basis for this communication. Ries in 1899 was the first to report on the subject of early postoperative rising. He had noted that his gynecological patients who rose from bed shortly after operation were considerably stronger that as a group they had a low incidence of post operative complications and that there were no demonstrable ill effects of early rising The early nsing technique was not then widely accepted in this country but in continental Europe it has been extensively used from 1999 until the present time. The recent revival of American interest in this subject began in 1941 when Leithauser (4) reported a series of 436 cases. Newburger (5) has published an excellent review of the American and foreign literature on the subject and also experi mental data of his own (6) from rats. Newburger s experiments showed increased strength in wounds of animals in the early postoperative period if they had been given postoperative exercise. Chinical papers have been published by Leithauser (3) Nelson Nixon Powers, D'Ingianni, and Schafer and Dragstedt. All these authors are impressed by the rapid return to full strength of their early rising postoperative patients and by the apparent early reduction of wound discomfort. Almost all of them note a low incidence of pulmonary com plications and of deep phlebitis of the legs. The latter three reports are the only ones in which any comparisons are drawn between a series of early rising patients and a control series. The definition of what constitutes early rising has not been very strict as some authors include in this group patients who have risen as late as the 4th or 5th

In order to arrive at an accurate appraisal of the day after operation. results of early rising cases must be compared under as similar circumstances as possible. Since the incidence of pulmonary and vascular compil cations appears to vary in different parts of the

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country the results of an early rising series in one region cannot properly be compared with those of a control series from a different region. The two series are most accurately comparable if they are observed in the same clinic.

In order to emphasize any appearent changes in postoperative complications this study is limited to the type of operative case in which the compil cations most commonly occur that is, patients having major abdominal surgery who rose from bed either on the first or second postoperative day are considered in the group of early users. These are compared with patients who remained in bed at least 1 week after operation.

This study compares 238 consecutive cases in which early rising was practiced with 443 in which it was not. The factors considered as possibly bearing on the incidence of complications were (1) age, (2) sex (3) type of anesthesia, (4) type of incision (upper vertical lower vertical and

The operations performed through upper abdom hal incisions were on the biliary tract stomach The operations through lower incisions were on the small and large bowel female internal genitalia, and occasionally the appendix. The procedures through McBurney incl sions were all appendicectomies. The suture tech nique was that of interrupted fine silk to all lay ers except the peritoneum where continuous chromic catgut was used

The complications studied were (1) pulmonary (atelectasis, pneumonia) (2) vascular (phlebitis, pulmonary infarct) (3) wound (disruption, in-

Our technique of getting the patients up from bed is modeled after Leithauser (4) The patient lection) Is turned upon the side on which he has his incison. The hips and knees are flexed. Thus the kness and lower legs are brought to the edge of the bed. The patient is then rulsed sideways to a sit ting position on the side of the bed. The advan tage of sitting up in this manner is that as the patient assists in raising himself he uses the flank muscles on the side opposite from his wound. As the patient sits on the side of the bed his shoes are

TABLE I -ANALYSIS OF COMPLICATIONS IN EARLY AND NON-EARLY BISTOR BATTERS

1	Mana .	Ley ching					
1	71190	Lay rates	34cond	day rising	Non-early dainy		
	No.	Per cent	No.	Per cost	Же	Percent	
Total patients	rij		n	1	443		
Crespfications Pulmonary	•	4,	4	7 \$		7.	
Atelectuals		,		5.7	- <del>-</del>	1 1	
Philefeltes	-	1		1		+	
Infaret	,	-		<del> </del>	<u>-</u>	+	
Fatal infarct		14		<del>                                     </del>		<del> </del>	
Wound disruption		1				<del></del>	
Weend infection		,		1	11	51	
Postecnia		54			<del></del>		
Diet		54			10		
Postsperative day of discharge yth-sock day	61	11	5	*	44	47	
th-13th day	57	31	16	<b>J</b> 0	-	21.6	
4th-46th day	Jo.	16	13	1,0	141	p. 1	
ryth day plus	35		•	17	rte	#1	

put on and then he stands up on a foot stool While standing on the foot stool, he is encouraged to breathe deeply and to cough several times after deep mapiration. This procedure is less poinful than when the patient coughs in bed and is often effective in raising mucous plugs from the bronch. He is now encouraged to walk 8 or 10 feet before sitting in a chair. On the first rising the patient remains in the chair about 10 minutes, and then returns to bed in the same manner as he rose. Our patients were gotten up twice each day. Usually by the third or fourth day they needed little or no assistance and could rise at will. All the patients were encouraged to move freely about in bed and to breathe deeply several times each hour

#### RESULTS

The most striking effect observed in early rising patients is the rapidity with which they regain their strength. In point of fact, they do not seem to loss strength. They are more active in bed, and their wounds are less dashling. On the fourth postoperative day most of the early rising patients had very little wound discomfort and got up unassisted. At this time they became ambulatory patients and required very little nursing care. As a result of this early strength and freedom from pain, most of the patients requested that they go.

We have exchanged supported to post despectables, with

(W) he we considered at responses to not on the particult alone, or skepers with herein before he means usught as procupitour aguinet deep positivities of he large when if the particult is one with about head cover, because it is neglet to a particular to the particular has particular all macrins by standing, stepping down from the host stood, we will have not pathological sequence could be limited.

home earlier than the non-early rising patient. We did not feel purtified in sending our patient bome before the several to ninth postoperalized by because not until then could we conside that the time for appearance of wound meterion or for ruption had passed. In spite of this, 40 per or of the early rising patients were discharged byte the 13th postoperative day while only 96 per or of the control group were discharged by this one. At the time of discharged, those of the card risks group were strong and able to do a great dealf were themselves in contrast to the group who had a mailted in bed for to to 13 days and were seaff discharged to 2 a days after return out of held

#### INCIDENCE OF COMPLICATIONS

Table I lists the overall incidence of complications. The complications in the patients who rue on the second day are separated from those was rose on the first day so that a more accurate pe ture will be given. As this study was begun, se were concerned lest there be a marked increase is the incidence of wound duruption among the early rising group. It is seen that instead of increase incidence of wound disruption, the early rises group had a slightly lower incidence of wound do ruption. Likewise the incidence of pulmorary complications was reduced. The incidence of viscular complications, however was somewhat itcreased. None of these increments are, as yet, it miscantly greater than the standard error of ther difference but they point the trend. The trend

TABLE IL-ANALYSIS OF PULMONARY COMPLICATIONS

STREET, SAME AND ASSESSED.		====			220	~~~									
	1		First	day rie	lag.				Non-early rising						
		Pass	monte	Atel	class	T	Mal		Paramonia			Atelectanis		Total	
	Namber	No	Per cest	No	Per	N	Per	Number	Va	Pe	No	Per cent	٧0	Per	
Inclaions (abdominal) Upper	Ł,				9.1	۰		9.8	,		200		5	,	
Lover	45		ł				1	54		1	1	5	7	4.5	
M Persey	50		}	-			}	φī		1			3	3.3	
Sex Female				•	5	7	5 0	<b>p</b> o		7	5	4.3	5	5	
Naje	67		]		3		3	14	1	3.5	3	rit :	170	14	
Ancethoda Ether	145		,	6	4.5	,	5.1	pos.	4	5	pć.	6.4	3	7 8	
Spinal	30		1	1		-	3	9				5.3		8.3	
Lotal	10					-	1	4		7				,	
Age 2-30 At-	63							5	4	3	,	50		1.5	
3 -40 yzs	28			,	17	6	5 8	3		3		5	IJ	56	
60 yrs phas	34				8.5	1	8 4	84		,	9	to			

toward earlier discharge from the hospital is seen in the greater percentage of the test group who were discharged early. This reduction in hospital days required and the fact that the patients who have risen early need less care represents a definite reduction in work for the ward personnel.

Pulmonary complications The diagnosis of arthertasis was made in our patients on a clinical bans if there was a postoperative use in temper attire associated with rikes and elevated respir atory rate in the absence of other demonstrable cause for fever. The diagnosis was also made if there was x ray evidence of atelectasis. The in cidence in the first day using group was 4.3 per cent of 3 per cent in the late rising group.

Table II is a comparative chart of the pulmonary complications analyzed for their various ethological factors. The familiar greater incidence of atelectasis in upper abdominal vertical wounds is seen in both groups when the cases are divided with respect to the location of the abdominal wound. It is significant that no case of atelectasis occurred in the cases with low abdominal wounds who rise on the first day.

Analysis for the sex factor shows that although the incidence of atelectasis in men who remained in bed was high it was unusually low in those who rose on the first day after operation. The incidence of atelectasis among the females of the two groups is essentially the same.

The analysis for the type of anesthesia shows no significant variation in the incidence of atelectasis

in either group whether ether or spinal anesthesia was used.

The influence of the age factor repents the familiar pattern of increasing incidence of stelectasis with advancing age in both groups.

Pneumonia was such an infrequent complication that it does not permit comparative analysis.

I ascular complications. The term phiebitis is used in this discussion to include both aient thrombods (phiebothrombods) and deep phiebitis of the legs. The disgnosis of deep leg vein phiebitis was made on the basis of tenderness in the calf muscles, associated usually with one or more other signs i.e. a positive dornsifiction (Homans?) sign edema of the lower leg or a rise in pulse rate temperature, or white count. Also if a patient had pulmonary infarct or embodism in the absence of heart disease, a presumptive diagnosis of phiebitis was made. The overall incidence of deep vein phiebitis among the early raing patients is seen to be greater than among those who did not rise carly (3 per cent vs. 18 per cent). See Table III

Analysis of the incidence of phiebits with respect to the placement of wounds shows that there was no phiebitis recorded in any of the McBurney incisions whether they rose early or not. The females had a higher incidence of phiebitis than the males in the first day rising group. The high est incidence of phiebitis in the non using group was in the patients of oo years or more, but in the early rising patients, the highest incidence was in the group between so and for years.

TABLE III.-ANALYSIS OF VASCULAR COMPLICATIONS

	<b></b>		First day risis	•		Non-ourly risk-				
	Number	n	detricie .	I	faret		Palabit		iktis Islant	
	N=24	N _	Per cont	No.	Per cent	Musber	16	Per cest	ж.	Per ma
inchione (abdominal) Upper	44	4	4.8		1.4	ryd.		,		1
Lower	45		4-4			54	,	<del>                                     </del>		+ ;
МсВигму	pó .		1			91		1		┪
Sex Texasie	1	6	5	-,		300	4	,		1
Male	67		1			141		1		<del>,</del>
Aresthania Ether	iu	,	,,	-,	1	408	•			1
Spiral	19		•			29		11		1
Local	130		1			14		1		
Age A-go you	43					tat .				
32-60 FTS.	#		5 7		3	431		1		
6 yes.phas	_#_		7			26		1		1

This observed increase in the incidence of post operative deep phlebitis of the legs is not great enough to be of irrefutable statistical aignificance. But it is significant that our data do not agree with many of the previously published clinical impressions that early rising produces a reduction in the incidence of phlebitis. Early rising is apparently not the answer to the problem of postoperative venous thrombous.

WOUND COMPLICATIONS Considerable interest was attached to the posibility of increase in wound disruption which might occur from the increased stress put spot its wound in rising from the bed and walking abort Wound disruption is here defined as any wound a which the fascla is shown to have separated whether or not the perstoneum remained hast Our data (Table IV) show an actual relation is

TABLE IN ANALYSIS OF WORDS COMPLICATIONS

			1441		MOUND					1 700 733	
	}	First day rising						Non-early rises			
		Tes	i latertica	Weed	Carplies		Test	Wound infection		Treat despite	
	Number (	No.	Per cent	No	Per cest	Number	No.	Per cost	He.	17:00	
Indicate (abdominal) Upper	4				-4	rpå		16		<u> </u>	
Leve	45				1	14		•			
McBarney	56		1			#	10				
Sur Famile	13					Jot .	14				
مذبلا	67				5	143	11	7.6			
Amerikania Paler	113	4			,	<b>F</b> 26	н			<u></u>	
Spinal	>>		6		1	•					
Lecal	-		+		_	14		1		-	
Age s-go yrs	4,				1	1	30				
р-борта		4	1		1	131	13	14		1	
A vin sins	ш		+		9	26		الساسا			

wound disruption in the test group. Among early rising patients there was I I per cent of wound disruption whereas in the non-name patients, there was 2 8 per cent incidence of wound disruption. The known higher incidence of wound disruption in upper abdominal incisions was demon strated in both series The two McBurney incisions that had wound disruption were those in which drains had been used.

The incidence of wound infection among the early rising patients was 2 7 per cent as compared with 5.7 per cent in the patients who rose late. This group includes all types of infection includ ing stitch abscesses.

It is interesting to note that all of the wound in fections in both series appeared in patients with potentially contaminated wounds. Of the 5 pa tients who had infected wounds in the early rising group there were a patients who had cholecystectomies and a patient who had an appendi cectomy for acute appendicitis. Of the 25 patients who had infected wounds in the non-early rising group 11 had appendicectomies, 10 cholecystec tomies, I a perforated ulcer and I a resection of the large bowel.

#### EVALUATION

We have now observed the technique of early postoperative rising for a years. Data on a control series of intra-abdominal operations are presented herewith. The most remarkable observation is that postoperative activity tends to maintain the patient's strength and endurance whereas prolonged rest leads to increasing weakness and It also appears that muscle muscle atrophy activity in the region of the wound has the tend ency to reduce the period of wound tenderness but it does not increase the incidence of wound distuption.

Early rising appears to reduce the incidence of postoperative atelectasis. This may be due to increased respiration and more effective coughing, especially when the patient is standing when his diaphragm can descend to lower levels (3) Since atelectasis most frequently appears during the first 48 hours after operation, the patient should be gotten up as soon as possible within that period if rising is to have a significant effect on prevent ing atelectasis.

In our experience the incidence of phlebitis or phiebothrombosis of the deep veins in the legs is not reduced by early postoperative walking. Our data agree with the published impression of D'Ingianni who observed early rising patients in New Orleans. There may be certain precautions which can be observed to minimize call muscle trauma when patients rise from bed. These are however equally important at any time in the postoperative period.

There was no greater incidence of wound disruption and infection in our patients who rose carly

#### SUMMARY

A controlled, preliminary study of early post operative rising and walking is made on patients having major intra abdominal surgery. A total of 681 cases were analyzed for postoperative complications and their causative factors. Early rising is defined as rising and walking on the first or second postoperative day

The patients who rose early were connderably stronger and had less pain in their wounds. They were able to care for themselves on about the fourth postoperative day and were ready for discharge considerably earlier than the control group

The incidence of wound disruption and wound infection was reduced in the early rising group

The incidence of pulmonary complications was somewhat lower in the early rising group

The incidence of deep leg vein thrombophichitis was observed to be somewhat greater in the early rising group

It might be postulated that some of the lat rising group develop signs of phicities of the leg wins at home several days after dacharge, so, it has not been apparent in the follow-up visits which are made days to vessio after ducharge.

#### REFERENCES

- 1 ALLEN A. W., LINTON R. R., and DONALDRON G A.

- J Am. M. Ast., 1045, 128 307

  a. D'IROLANIA, V Arch. Surg. 1045, 50 214.

  b. LETTHAUSER, D J Arch. Surg., 1045, 47 4-95, 20-3.

  LETTHAUSER, D J., and BEROO, H. L. Arch. Surg., 1941 42 1086.
- NEWBURGER, B. Surgery 1943, 13 602.

- Obst., 1945, 81 93.

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APRIL, 1946

#### RESTORATION OF CONTINUITY VERSUS CURE IN CARCINOMA OF THE RECTUM

HERE is a widespread revival of operations designed to preserve the rectal sphincter in patients with carcinoma of the rectum and rectosigmoid. This aim to preserve the sphincter is a natural outcome of advanced surgical akili and tech nique on the one hand, and on the other of evidence that primary spread of disease from this region is cephalward. At this time we must carefully weigh the evidence of experience and adopt a rational attitude regarding the problem.

Given a patient with carcinoma of the rectum we must take into consideration the single fact that cure if possible is our obligation. Unfortunately many of these victims arrive in an uncurable condition—a fact due mainly to our inadequate educational methods, although at the moment there seems

to be no effective manner in which all cues can be diagnosed in an early state.

In a recent series of 100 consecutive retients with carcinoms of the rection the average duration of disease before entry into the Massachusetts General Homital was . months. Twenty-eight had such extense disease that a resection was impossible Seventy two had an abdominopenneal resection in one or two stages. There were two deaths in this group -a postonerative nor tality of 2.8 per cent. One patient died from hypertensive heart disease, and the other of a pulmonary infarct. About to per cent of the resections were done in the presence of hepatic metastases. Including the operative deaths, approximately 45 per cent of the operable cases or 30 per cent of the entre group will live 5 or more years. It appears at this time that only earlier diagnoss vil materially improve these results.

The best safest, and most adaptate operation so far devised is the combard abdominoperineal resection of Miles Technique may be varied in many sais and the operation may be done in one of the stages. This method allows the surgest is emove the local spread of the disease noticing the regional lymph nodes and extension neighboring visceria as well as to permeasurables. In skilled hands, the mortality rate is low and the morbidity is growing less with better preparation and after-care. This procedure however does leave the patient with a permanent colostomy.

Colostomy is not burdensome to thousand of grateful individuals who have been card of cancer With reasonable care they are free to carry on their business, athletic and social functions without offense or incon the venience. Sentimental abhorrence of the colostomy by patient and physician has wasted many useful lives. Although none looks forward to a colostomy life with avid joy few will refuse it if the entire situation is existed to them. Taught the simple printial concerning care of the colostomy nearly all of these patients are comfortable and happy

In performing resections with low anastomosis, one must consider the following rules governing a proper operation for malignant disease. First, have we given the individual patient his greatest chance for cure? Second have we increased his immediate hazard? Third will the morbidity from poor sphincter control or fistula formation justify the procedure? The second and third of these have

been pretty adequately answered in a satisfactory manner. The first concept is not yet determined and it will take considerable time to do so. In reporting results on these procedures surgeons must make it clear that local recurrences have not taken place in those patients whom they would have expected to cure by performing a complete expected to cure by performing a complete of timpation of the rectum and the muscles of

the perineal floor

The issue is confused by the fact that all of
the issue is confused by the fact that all of
sagree that restoration of continuity is
justifiable if the patient has metastatic dis
ease in the liver at the time of operation
These cases should not be considered in the
same light as those whose spread of disease
was limited to the resectable area at the time
surgery was undertaken

#### THE SURGEON'S LIBRARY

#### REVIEWS OF NEW BOOKS

Title book entitled Penicillis in the Traineast of Infections by Keefer and Anderson presents in its 42 pages a clear summary of what is known of penicillin and its effect, but it does not disclose any new facts about its action or administration.

tration.

Penicillin seems to act like the sulfonamides by interfering with some metabolic processes of susceptible bacteria and therefore is active only when the bacteria are in a phase of growth and multiplication. In the concentrations that are achieved in living beings its effect is chiefly bacteriostatic and not bacteriocidal. Thus it does not actually eliminate the infecting organisms but inhibits their growth and multiplication. But unlike the sulfonamides, penicillin is not inhibited by pus, peptones, or the breakdown products of tissue autolysis. The sensitivity to penkillin varies with the various species of organisms. It is not understood yet why gram negative bacilli and virus infections are not susceptible to the action of the drug por why susceptible bac term may become resistant when exposed to the drug for longer periods. However it has been shown that certain bacteria of the coli group produce a substance penicillinase, which inactivates penicillin. The sensitivity of any bacterial strain to penicillin can be determined and may be very useful in the treatments of certain infections. Of considerable importance is the fact that there is no correlation between resistance to penicillin and resistance to the sulfonamides.

Several biological assay methods for determining the concentration of penicillin in the blood and the body fluids are available. It has been found that 60 per cent of the amount of penicillin injected in the blood stream or the muscles were excreted in the urine within a hour and that little or no drug remained in the blood after 3 hours. For this reason, it became evident that the use of large doses of the drug was wasteful since a better bacteriostatic level could be maintained in the blood by the administra tion of small doses given every a to 3 hours. It has also been shown that when mixtures of penicillin in becswax and peanut oil were injected intramuscu larly, the drug was absorbed slowly and the thera peutic effect could thus be prolonged to 6 or 7 hours.

The authors recommend for the treatment of systemic infections the intermittent intramuscular administration of penicillin. Intermittent intravenous

PROVIDENT IN THE TEXAMENT OF PUTERSONS BY Chester S. Krifer B.S. M.S. M.D. Sc. D. (Box.), and Dennid G. Anderon, A.B. M.D. Mey. York, Landon, Towards Edded by Henry A. Christian, A.M. M.D. Li. D., Sc. D. (Ron.). FACT Son. F.E.C.P. (Can.) Oxford University Press, p.43.

injections or continuous intravenous or intrascular infusions offer no advantages and are conferably less convenient.

The passage of penicillin from the blood into the cerebrospinal fluid or the various parts of the ere h minimal and noneffective. Its passage into the pleural, abdominal and synovial carmes is seen what more satisfactory It is therefore recommended to inject penicillin directly into the subunched space the cerebral ventricles, the articulation the pleural cavity the cranial sinuses, the clumber of the eye, etc. Topical application of pencilla a superficial burns skin infections, and inicite wounds by means of wet dressings or robber other has given excellent results. The dorage and the next adequate way of administration are documed for the various methods of administration of penicain, the clinical aspect of penicillin therapy is presented with more details in cases of staphylococcic better emia of the face, acute hematogenous estronychia, chronic osteomyelitis, staphylococcie pocanosi, multiple subcutaneous abscesses, hemolytic stapes coccal pneumonia and empyema, gonomica, poingococcemia, pneumococcic pneumona, poemcoccic meningins, subscute bacterial endocadas, gas gangrene and syphilm. The toric reaction at rare, the more common being urticara and level.

Penicillin is without doubt the most efform agent for the treatment of infections disease. He ever it should not replace or disminish sixtu septi ascepsis, the early surgical treatment of women, as general medical prophylaris against infectors diseases. Gorger Print.

AMONG the noteworthy publications of its licit and Department of the United Stars torm Patkadery of Treylead Diseases by Ask and Sar will find a place in the first rank. It fish a seed set much by textbooks on tropleal medicine, which are found to the processing of the place emphasis on etiology chieral shows which is a collection of pair photographs, possible micrographs reconsequencement, and drawent seed without naterial in highly exceptable form, it witness that the authors had a well-the disasting hand, because nearly every illustration is one of the best possible. The technical quality of the propositions is united by the proposition of the prop

PATROLOGY OF THOMCAL DECISES: A ATLA BY J S his Clark
M.C. U.S.A., and Sopkie Split, M.D. C.S. A.U.S. Planking and
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Nearly every disease to be found in the tropics, from ainhum to yellow fever is dealt with. Brief explanatory notes which include enough information to orient the reader and sketches of the epidemiological facts are provided. The sallent features of each duesse are presented in excellent photographs

This is an authoritative book. Although atlases are often thought of as supplementary works this or x-ray pictures. particular one is outstanding because it is a highly intelligent contribution designed specifically to illummate where illumination is most needed. It is recom mended to students of tropical medicine and to pathologists who will be confronted with the se quelae of tropical diseases.

A LONG standing gap has been filled by Thomas and Haddan a Ampatation Prosidests' by bring ing together two authorities who have combined their knowledge to present a practical guide for surgeons and practitioners on the proper use of orosthetic appliances. This dual authorship—a urgeon and a manufacturer of artificial limbsprovides a common ground for discussion of the

The mutilating injuries of war have awakened an problems of the amputee. increased interest in amputations surgical technique and prosthetic appliances. It has been estimated that the number of amputations resulting from the First World War totaled 500,000 for all nations engaged Amputations among the armed forces of the United States were relatively small, however numbering only about 4,000. During the Civil War there were well in excess of 30 000 amputations in the Union Army alone. Figures for the Second World War released as of July 1 1945 reveal that over 15,000 amputation cases have been treated in the various amputation centers established by the Army and Navy of the United States and no doubt there will be many more before the toil of the war is The total number of amputations resulting from World War II will probably exceed a million The number of amputations performed each year

among the civilian population of this country far exceeds amoustions berformed in the armed forces even in wartime. The American Federation of the Physically Handicapped has estimated that there are approximately 75,000 new amputation cases in this country every year and that of this number 40,000 are major amputations requiring prostheses. National Safety Council has reported that, prior to World War II 32 500 amputations resulted annually from accidental causes alone. Reliable estimates reveal that there are now approximately 925,000 amputees living in the United States. The artificial limb manufacturers of this country report that prior to the present war they were supplying prostheses to more than 70,000 persons annually

ABFORMUM PROTESSES AMPOSED AND PROTESSES COMMUNEAU SERVE, WITE PRINCIPLES OF ALBERTAIN AND PROTESSES OF ALBERTAIN AND PRODUCED AND PROTESSES OF ALBERTAIN AND PRODUCED AND PRO

In the past, too little attention has been paid by surgeous to the problem of the artificial limb which the amputee must wear throughout life. As a result, amputations rarely have been considered from the

There is a great need for closer co-operation prosthetic point of view between the surgeon and the limbmaker Occasion ally and unfortunately surgeons, through lack of information fall in advising the patient as to his per manent prosthesis or in supervising its fitting Few surgeons are familiar enough with prosthetic appli-

ances or limb fitting to give such advice.
There is a definite need for a practical text devoted to the amputation prosthesis Such a text to be of value, should be concerned primarily with principles of fitting and aligning the proathesis and with instructions as to its use. In this book, the surgeon and limbmaker have collaborated combining the scientific knowledge and training of the surgeon with the mechanical skill and practical experience of the limbusker in order to give to the physician and the limbmaker alike a practical manual on the selection fitting, and use of artificial limbs

In the construction of the amputation prosthesis, emphasis is placed on simplicity of design and light ness of weight with durability Materials used are important only insofar as they are light and durable and lend themselves readily to the necessary adjust ments of alignment and fitting. The choice of ma terials often will vary according to the individual needs of the amputee depending upon such factors as the site of amputation and the age, sex, occupa tion, and physical condition of the amputee.

Elaborate and complex joint mechanisms and control, despite extravagant claims of manufacturers and salesmen, are not essential in the average pros thesis. They add considerably to the original cost are more difficult to adjust and repair and offer few If any advantages over the more simple standard types The ordinary amputation proathesis is really a very simple apparatus mechanically, and if it is properly aligned and fitted it fulfills its functions most satisfactorily without complicated mechanisms

Of far greater importance than materials and types of joint mechanisms in the successful use of a prosthesis are the proper dispunest and filling of the This requires considerable skill based on experience and judgment, and a thorough under standing of certain fundamental anatomic and physical standing of certain fundamental standing of certain fundamental anatomic and physical standing of certain fundamental standing lologic principles. Surgeons and limbinakers silke barge principles. Ourgeons and importance arise importance of materials and complex mechanical devices, neglecting the all important principles of alignment and fitting In this text considerable attention is given to these fundamental principles.

Both the surgeon and limbmaker should guard against unwarranted claims and against encouraging Ill founded hopes on the part of the amputee.

One chapter of the text pertains to prostheses for children-a subject which presents certain special problems and which heretofore has been given little or no attention in surgical texts

A chapter is also devoted to the subject of the rehabilitation of the ampute. Particular emphasis is placed on the importance of the emotional readjust ment of the amputee to his handicap. Attention is directed also to the necessity for instruction and training in the proper use of the prosthesis. Vocational guidance and selective placement in employment are also emphasized. Consideration of these problems, so often neglected, are of the greatest importance in the successful rehabilitation of a person handicapped by the loss of an extremit

Special acknowledgment is given to Captain Henry Kersler MC USNR, for use of photographs and diagrams demonstrating his cincipastic amputations and illustrating postoperative care of the stump preparatory to fitting the proathesis, as well as for his valuable contribution on the subject

of rehabilitation of the amoutee

The text covers the following subjects development of modern amputation prostheses the amputation stump prostheses for amputations of lower extremity alignment and fitting of lower extremity prostheses upper extremity prostheses prostheses for children and rehabilitation f the amputee

In comparison with some sidely publicized contributions on the sam subject, the real let will find the present volume a pleasant rehef. The book is remarkably practical throughout. The illustrations are unusually instructive.

PHILE LEWY.

As a result of his deductions from a study of the embryology and comparative anatomy of the stomach the author of The Musical Build and

Movements of the Stomack and Duodenel Bull take that the human stomach consists of four parts. Each part is homologous with each of the four storached ruminants. He suggests that the forsit of the human stomach is bomologous with the rame and the corpus with the reticulum (second storact) These constitute the longitudinal stomets. The transverse stomach which is usually idented to a the pars pylori, beginning at the incisura he dwies into three parts. The "slaus fans out downered from the incisura forming the knee or ellow a the greater curvature. The membrana annihus' fans out upward from the junction of the sne val the pyloric canal, to form a bulge on the lener canature between the incisura and the pyloric cand Thus, the sinus and membrana angulara ion what is frequently referred to as the pylode was bule and the pyloric canal, called the pyloric antrum or "prepyloric region. The droderal bea appears to be correlated with the pyloric spherer, which structure contains a duodenal as well as gastric component

His anatomical description of the arrangement of the muscular fibers in the stomach in relation to the pyloric portion of the stomach and sphericer a

enlightening.

The book is recommended to all students of the anatomy and physiology of the stomach.

ARTHUR J ATENAN

The M wilds Build to Mountains of the Sonate with bested Britis, Essential in a Resident to the Sonate with service Derivation of the Sonate in the Leaft of Constant A most to Emerication 37 John Tempera Oh, New Fabrillas & Season Balletjikim 1941.

#### CORRESPONDENCE

BLOOD AMYLASE ACTIVITY IN PANCREATITIS AND OTHER DISEASES,
A SIMPLE DIAGNOSTIC AID—4 Correction

The February 946 issue of Sundery Gyne coloor and Obstetrics a correction should be made in the captions for the color insert which appears opposite page 113 in the article entitled

"Blood Amylase Activity in Pancreatits and Oldr Discuss: \ Simple Diagnostic Aki" by Derd Polowe in row C the third figure should be label +± ± (2/4+) April, 1946

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# INTERNATIONAL ABSTRACT OF SURGERY

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# ABSTRACTS OF CURRENT LITERATURE SURGERY OF THE HEAD AND NECK

#### EYE

Ridley H: Ocular Manifestations of Malnutrition in Released Prisoners of War from Thailand. Bril. J. Opkik., 1945, 29, 613.

The author reports on the unique opportunity offered by the examination of 500 releazed allied prisoners of war and interners from Thailand who believed that their vision had deteriorated during their captivity. Food had been deficient in quantity and especially lacking in proteins, fats, and vita miss. Meals had consisted mostly of polished rice vegetable stow, a small quantity of meat and tea. For a period of 6 months the food had been reduced nearly to the starvation level, with only rice and salt for one period, and it was during this time that most of the visual symptoms occurred. Ninety of 100 patients were amblyopic.

In many cases the amblyopus had occurred during a single day in others the onset was more gradual. Night blindness was uncommon. Camplimetry revealed in 90 cases a small central scotoma not usu sily extending over 3 degrees from the faxtion point, although in the severe cases it was much larger Aboved normal fund, but in others a temporal pailor of the disc was noted. Altogether there were 48 definite and 30 doubtful cases of optic attrobive.

Practically all of the released prisoners showed some degree of keratoconjunctival abnormality usually an increased vascularity at the limbus with the formation of aneutysms, and vessels and opacity extending into the cornes for about a mm. There were 3 cases of interstitial keratitis with negative Kahn testa.

While there seems no doubt of the relationship of the vinal disorders described to the nutritional deficiency the author is inclined not to place the entire blame on a single vitamin deficiency but rather on the general malnutrition of the prisoners. However some of the changes described might well be secondary to deficiency in vitamins of the B group. There was noted a high incidence of arrus sentils in this relatively young age group and this slab suggests a detangement in fat metabolism

Treatment in these cases included a full det and supplemental vitamin therapy. The author plans to offer a later report showing the results which have been achieved. In the severe cases with marked optic atrophy too much improvement is not to be expected. Visual acuity at the time of the original examination varied from 1/60 to a partial 6/6 WILLIAM AMARY MID.

Sen K., and Ghose, N: Ocular Gnathostomissis.

Brit. J. Opkth., 1945, 29 618.

Few cases of parasites recovered from the eye have been reported. The author reports the first case of gnathostomisus in the human eye. In fact, this infection is quite rare in the human being and up to 1937 only 24 definite and 60 clinical cases had been reported and these involved the stomach, large, kildneys, mastod and subcutaneous tissues.

The present instance occurred in a s6 year old Hindu who was admitted to the hospital for investi gation of an orbital cellulitis with hemorrhage in the retina and vitreous of the left eye. He developed an intia and after a considerable period of treatment a moving pigmented nodule was noted in the an terior chamber imbedded in the ins. Slit lamp ex amination revealed it to be a worm.

The parasite was removed after a retrobulbar in jection to reduce the intraocular tension (which had been elevated). After a suitable incision with a thin Graefe knile the worm was removed in tole with a curette. Recovery was uneventful. Later examination showed the disc to be strophic and the arteries thin and sheathed, and there was a pigmented scarbin and sheathed, and there was a pigmented scarbine to the macula. As this was not present on the first examination it was believed to be the point of entrance for the parasite. WILLIAM, MANN M.

Rosen E.: Disbetic Needles. Brit. J Ophth 1945 29 645

The author points out that in dishetics characteristic changes can be found in the lens in addition to the accepted ocular signs of dishetes such as rubeosis iridis, small globular hemorrhages at the macula, retinitis proliferans, retinitis circinata, sudden onset of hyperosia, and licentia retinalis.

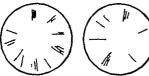


Fig 1 In this case the patient had no knowledge of having diabetes. The vision was 20/100 in each eye, and was correctible to so/30 in each eye. Examination of the ions revealed the presence of diabetic needles. The fundus showed no evidence of diabetes. Urine examination disclosed the presence of sugar





Fig. s In this case the patient was 60 years of age. She had had diabetes for z years. Diabetic retinitis was present especially at the macula. In the periphery of each ens there were several diabetic needles amerimposed upon the includent cortical opacities.

He describes a lenticular sign in diabetics which when present is considered specific for diabetes. It is known as the diabetic needle or "roman numeral" sign-a linear black spoke in the periphery of the lens which is no thicker centrally than it is peripherally. In all cases the spokes were never thicker at the periphery of the lens than at its center and they were seen best with the indirect ophthalmoscope or the retmoscope,

A series of 10 cases which presented these so-called "diabetic needles" is reported. Many of the cases also presented nuclear and cortical lenticular oracities. JOHN TA ZUCKERNAN M.D.

Smeleer G K., and Ozanica, V: The Effect of Local Anesthetics on Cell Division and Migration following Thermal Burns of the Cornes. Arck. Ophik., Chic., 1945 34 271.

Smelser and Ozanica discuss the effect of local anesthetics on cell division and migration following thermal burns of the cornes.

They conclude

Topical application of most anesthetics inbiblts mitosis in the intact corneal epithelium if they are of a sufficient concentration to produce andthesis.

- The inhibition of cell division varies with the drug the method of administration and the faquency of application.
- 3 If aneathetics are applied locally to most burns the migration of epithelial cells over the a jured area is markedly inhibited.
- 4. Most anesthetics also inhibit cell divolonis in regenerating epithelium.
- Some drugs inhibit mitous but do not retail ceil migration. 6 Nupercaine and phenacame ointments prober
- prolonged surface anesthesa, but do not bear mitosis in normal epithelium nor retard cell dicita or migration in regenerating epithelam.
- 7 Unbuffered aqueous solutions inhibit bester more than continents of the same or of grown strength. JOSEPA ZUCKERNAN, M.D.

### Roper K. L.: Senile Braline Scient Flores. Arch Ophik., Chic., 1945, 54 153. The author reviews the literature on a chank

asymptomatic entity be calls senile hysline atmi plaques " and reports 5 cases of his own. There plaques, which are rectangular round, or oral and of a slate gray color are symmetrically should about 3 mm. from the limbus and about 1 #1 anterior to the insertions of the lateral or work frequently of the medial rectus musics. The patches are slightly depressed and translament clearly Patients are generally unaware of the prience of the condition.

Advanced ago associated with dehydration rel progressive scierosis is considered the next per disposing factor in the disease. It probably is det a local nutritional disturbance resulting for arterioscierosis and the stress and strain on the sciens. For this reason the term senile system acleral plaques," is preferred to more conferm

names As far as a differential diagnosis is emeened for author points out that acleromalacia perious primarily necrotic in origin, whereas scient phoare degenerative brawny scientia is an investor granulation there and plasma cells and process deeply pigmented, whereas acteral plaques are par-JOSEPH ZOCKERNIK, M.D. and nonplymented.

### EAR

Hall, I S.: Fenestration of the Labyrinth. I le Otal Lond., 945 60 200.

The author reports his experiences with the feet tration operation for deafness due to otoschoos h 71 cases during the past 6 years. The action operation is essentially the one stage procedur is veloped by Lempert from the multiple star cedure of Sourdille A pedicle flap consisting of the thin skin of the bony posterior and superior sall a the external canal attached to the drum members is preserved to cover the fenestrum. The esting prefers the postauricular mastoid inches to the endaural approach The annulus tympanicus apmoved in the upper portion and the incus and head of the malleus is resected using care to preserve the skin flap attached to the drum in an undamaged state A dissecting microscope is used while working on the labyrinth capsule General anesthesis, con sisting of heavy premedication and light ether is favored since immobility of the patient is desirable when using the microscope. The fenestrum is made ever what is considered to be the ampuls of the hort ontal canal Electrically driven burrs of various ypes are used Important points in the making of he fenestrum are considered to be the use of irriga tion to remove bone dust and the care with which the endosteum and small bone chips are removed by means of small scrapers and needles. Paraffin gauze is used to hold the skin flap in position and is removed after from 5 to 7 days. Skin grafting of the cavity is sometimes carried out at the time of the first dressing by either the Thierach or pinch method The results have shown a steady improvement

over the 6 year period and approximately \$5 per cent of operations during the past year are considered to be successful Revision of a fenestrum which has closed is a more delicate procedure than the primary operation and entails greater risk to the membranous labyrinth. The opinion is advanced that even in cases in which the fenestrum has closed subsequent deterioration of hearing appears to be arrested as has been shown by comparison with the opposite ear Fallure to orient sounds has been noted on several occasions following the fenestration operation but vertigo has not been troublesome after the first weeks

The causes of failure which are commonly met are closure of the fenestra advancing age and the presence of nerve dealness infection, and technical

failure

### NOSE AND SINUSES

Bernfeld, K. The Genesia of Typical and Atypical Cysts of the Nasal Floor Lar Old Land,

The term cyst of the nasal floor, is applied by the author to prominences of the vestibulum of the nose, strated either just in front of or behind the sper thra pyrilornia, extending to the lateral corner of the nasal floor and containing a liquid matter. They are rather rarely encountered. As a result of the author's experience it appears that small soft cushions of the mucous membrane with very little or no contents, are considerably more common. If, in the routine examination rhinologists did not omit the lowest, most laterally situated corner of the nasal cavity formations of this type would not be compressed nor escape attention. The author belleves it may be helpful to clarify the genesis of these

The distinction between typical and atypical peculiar cystic formations. cysts has been made from a clinical and not from a

The diagnosis offers no special difficulty if the cyst genetical viewpoint. is found at its typical site within the soft parts.

Palpation from underneath the upper lip with simul taneous probing will at once clarify the nature of the tumor found there Aspiration yields a translucent yellowish fluid in which usually no cholesterol is

The most important cyst in differential diagnosis is the radicular dental cyst excluded by radiography contained

As long as the typical or atypical cysts are small and cause no symptoms, any kind of treatment is superfluous If however the growth of the cyst suppuration, or some other condition makes its removal imperative the procedure should be a radical one by peroral approach underneath the upper lip The operation should be followed by cauterization

The total number of cases presenting typical which ensures a firm scar nasel floor cysts was 3, that of atypical ones 21 4 of the patients were children (3 girls of 8 11 and 12 years, respectively and 1 a boy of 7) 17 were adults between the ages of 28 and 38 years.

The cysts occurred unlaterally in 13 cases (in 8

cases on the right) and bilaterally in 8 JOHN F DELFH M D

Beck, A. L. Abscess of the Nasal Septum Compil cating Acute Ethmoiditis. Arca. Otolar Chic.

Abscess of the nasal septum may result from in fection anywhere in the neighboring tissues, but such abscesses occur most frequently after accidental or surgical traums. The pus may be found on one side or on both sides of the cartilaginous and bony framework The author reports 2 cases in both of which incision on one side only was adequate

The cartilage apparently disintegrates for frag mentation or sequestration of cartilage or bone is not always recognized at the time of and following surgical drainage Abscess of the septum following trauma is preceded by the formation of a bematoma between the mucoperichondrium and the cartilage. Abscess following sinusitis probably is not preceded by the formation of a hematoma. There was no hematoma in either of the cases reported

Abscess resulting from injuries accompanied by simple and compound fractures of the nasal bones must be a rare occurrence since the author has not observed it over a period of many years Observa tions of persons injured in automobile accidents as they appear in the accident room of the hospital serve as the basis for this statement.

Abscess of the septum has been reported following endonasal antrostomy performed through the in ferror measus. This may possibly result from instru mental trauma to the lower part of the septum in

the performance of the operation. The one unfailing symptom of septal abacess is complete usually bilateral, obstruction of nasal breathing Tenderness, pain in the nasal and orbital regions and swelling of the nose are also present. The mucosa covering the septum does not shrink when epinephrine hydrochloride and other vasocon strictors are applied.

#### мопти

Pionatelli, G : Solitary Naurinoma of the Tonone (Neurinoma solitario della Hosma) Giar tial chie na e

The author describes a solitary neurinoms of the tongue in a patient aged so The condition had been in existence for 8 months. The tongue had a normal color was moist and showed no impairment of its movements. A tumefaction was palnable at the tinof the tongue, this was elastic of rather hard conaustency and was not sharply circumscribed. Pain could be provoked only by strong pressure. The lymph glands were not involved and the Wasser mann. Sarha, and Meinicke reactions were negative.

Various conditions had to be considered in the differential diagnosus Cavernous angioma is easily recognizable by its color and compressibility communitied fymphanesoma is relatively hard and is usually found on the lower surface of the tongue linenal papillae are paually enlarged. Carcinoms or sarcoma of the tongue has a rapid evolution. Fi broma usually has a submucous location but it may be nedunculated. Linoma, as a rule resembles a fibroma clinically but its consistency is softer Synhilis of the tongue in the form of a summa involves the surface of the tongue and shows a tendency toward ulceration. The blood examination confirms the diagnosis. A tuberculous granuloma as a primary manufestation of tuberculosus is very rare as a rule signs of pulmonary or intestinal tuberculosis are present. Actinomycosis of the tongue shows a rapid evolution and the hard nodules gradually become soft and lead to the formation of fiatulas. Hydatid cysts of the tongue are extremely rare and reach a considerable size. Glandular cysts usually have a marrinal location. Conrenital cysts are found at the base of the tongue and in the region of the lineual V

The author removed the tumor under local anesthesia. Its weight was 30 gm. The histological diagnoses was neurinoma. Such tumors originate from Schwann's sheath. Several varieties of the tumor such as neurofibroma or neurinoma sarcoma todes, and neurocytoms, have been described Parallel fibrillae cemented together with a protoplasmatic substance and nuclei located at various helehta are characteristic for neurinoma. location of the neurinoms at the tip of the tongue is very rare. No anatomic connection between the tumor and a nerve trunk could be established Many workers consider the tumors to be hamar tomas or aberrant formations of neuroblastic origin. IONETH K. NARAT M.D.

#### NECK

Shirer J W., and Cohen M: The Effects of Thiouracil on the Thyroid Gland. Ass. Ist. M., 1945, 23 790.

Six hyperthyroid patients were treated with thiouracli for varying periods to prepare them for

thyroldectomy These periods were relatively than from o days to a month, except in a justine h which the thiouracil medication was continued in months. Two of these nations had previous ben prepared with lodine and subjected to a lobertone and the histological picture at the first operation in shown the more or less twoical lodine investigat effects

At the second operation the remaining lobe in a st these patients exhibited the typical hyperplatic thioursell picture, i.e., small empty actor and hi rate aranular cells with large pale central anda, while in the other case the histological pictor w sembled a simple colloid poiter, unaffected by the thioursell except in isolated hyperplatic rather where the typical thiograpii effect was evident in nearly every instance the shad or lobe spound friable and vascular upon removal, so matter sixt the amount or character of the preparation and the postoperative reaction was rather severe cres sepromaching that of the thyrold crais. Nevertheles a I patient, to whom no lodine had been administrati and to whom thiouracil had been given for only to days preoperatively the gland did not specvascular or friable and the postoperative matter was mild, and yet the microscopic picture revealed a typical thiogracil effect in other words, it was me always possible to correlate the clinical and the nathological pictures in this series.

In the case of the patient who had taken thous cli for 7 months preoperatively no mention is made of gland friability and there was no postoperary reaction, the microscopic picture showing a patriy architecture with hyperplastic areas, which was not like an untreated Graves disease than a train thiouracil effect. This was interspersed with less darker celled acini and large masses of colloid, who gave the appearance that the gland was underpite

a colloid involutionary process.

Although it is admitted that thiourses will come trol clinical hyperthyroidism in the patient who has undergone operation as well as in the patient was has not been subjected to it, the authors are of the opinion that lodine is still the drug of choics for preparing the thyrotoxic patient for operation. The opinion is based upon the technical diffication to perienced by the surgeon because of the incress vascularity and friability of the gland shick in been prepared with thioursell, the frequent story postoperative course, and the fact that student have not as yet been set up to determine shee the patient under thiouracil medication is resty for operation.

Many excellent photomicrographic reproduction accompany the original article.

JORGE W BRESCHE, M.D.

Bartals, E. C.: Thiobarbital in the Treatment of Hyperthyroldism. J Am. II Am 1913 LT

Astwood has reported that diethyl thiobarbing acid (thiobarbital) has antithyroid activity mile to that of thiourscil. Experiments on rats showed that thiobarbital in small doses was somewhat more effective in infibiting thyroid function and perhaps less tone than thiourscil. However animals which received thiobarbital in larger doses were found to have fatty infiltration of the liver.

The opportune moment for the author's initial irrial of thiobarbital came in October 1044, when a patient receiving thiouracil developed a lever reaction which necessitated discontinuance of treat ment but further antithyroid therapy was essential before thyroidectomy. This first experience with thiobarbital revealed that this drug has unquestion able antithyroid action in human beings and that semilitrity to thiouracil does not preclude its use.

Throbarbital has now been used at the Lahry Clinic in the treatment of 28 patients with hyper thyroidism and definite and satisfactory anti-

thyroid response was obtained in all.

Of o patients in whom toxic reactions to thioura cil developed 7 tolerated thiobarbital which produced complete relief of the hyperthyroldism

Eight of the 28 patients receiving thiobarbital, or 28 per cent, developed toxic reactions to the dury The depressive change in the white blood cells was the only serious reaction. Two patients developed agranulocytosis. There was no death due to the

drug

The time required to control hyperthyrodism with thiobarbida was found to be the same as that with thiouracil. The antithyroid effect of thiobar bital is apparently twelve times that of thiouracil, since o.o.g m. of thiobarbital accomplished the same rasult that o 6 gm of thiouracil accomplished Since no sade effects were observed with the smaller dose (o o g gm) further studies with this dose seem justified to determine its disincal effectiveness.

The anesthesis and postoperative course of patients treated with thiobarbital is similar to that of the thlourself treated patient. The combined use of the blobarbital and iodine produced satisfactory in-

volution of the thyroid gland

The high percentage of reactions to thiobarbital has led to the use of thiobarbital for only those patients unable to tolerate thiouracil

JOHN E. KIREPATRICK, M.D.

Barr D P., and Shorr E.: Observations on the Trentment of Graves Disease with Thiouracil Ann Int M., 1945 23 754.

Among see cases of thyrotosicosis treated with thiouracil, remission was induced in 87. The drug exerted a beneficial effect on emaciation tremor hyperkinesis, and the circulatory symptoms also on the basis metabolic rate cholesterol levels the creatine defect and on the tendency of thyrotosic patients to kee nitrogen calcium and phosphorus Protrusion of the cychalis was not decreased but lift spam and lift lag were decreased or controlled.

Benefit from thiourneil was often apparent in less than 10 days, and normal conditions were usually attained within 40 days. Factors tending to retard the rate of response were the previous use of lodine and large nodular solters.

Of the roo cases, 73 presented successful results in the sense that the thyrotoxicosis was maintained in remasion. In 37 of the 73 cases, the drug was withdrawn for from 2 to 16½ months without relanse.

There were 3 deaths from circulatory complications, but none could be justly ascribed to the action of the drug. In 12 cases unfavorable symptoms resulted in withdrawal of the drug. Two cases of agranulocytosis were encountered.

SAMUEL KARN M.D.

Snitman M F: Carcinoms of the Larynx Significance of the Histopathological Study of Serial Sections; Preliminary Report Arch Order Chic., 1045, 42–178.

This report concerns itself with the histological study of a block of laryngeal tissue removed by thyrotomy. The block of tissue included about of cm of the anterior end of the right true and false cords.

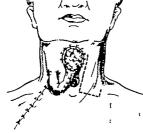
Microscopic study revealed incomplete removal of the cancer in situ of the right true cord. Although the lesion involved almost exclusively the region of the glottic lip of the entire length of the true cord tissue there was no subjective or ventricular extension. The presence of a greater length of cancer in situ anterior to the hornifying carcinoma, and of only a small amount posteriorly caused the author to conclude that the lesion grew to the anterior commissure and extended to the opposite cord.

A true picture of the laryngeal pathological changes could not be determined from the original specimen. It is believed that serial histological studies of laryngofissure specimens would prevent delay in the management of residual malignant mooplestic tissue. Noar D Farancart M.D.

Ivanisaerich O and Ferrari R. C 1 The Treatment of Extensive Pharyngostomies following Laryn gectomy (El tratamiento de los graedes farinçostomas consecutivos a la laringectomia) Bol Inst clin quir B Air., 1945 st 186

Before the development of the modern technique extensive pharyngectomy following laryngectomy was frequently necessary because of necrosis and infectious processes heal spontaneously or the remaining small fistulus close following minor surgicular procedures. However in a certain number of cases infections or necrotic processes produce an extensive pharyngostomy especially if a large portion of the anterior aspect of the pharynx persites. Fortunately such cases are rate.

As a rule pharyngostomics develop in patients irradiated prior to the operation because the connective tissue undergoes certain changes. Because of such changes in the aurrounding tissues a repair of pharyngostomy is very difficult and disruption of the wound is the rule rather than the exception



Second stage of the operation.

In 4 cases the authors succeeded in reconstructing the pharynx by using a tubular cervicothoracic flap When the suture line of the tube formed a scar the circulation at the distal end of the tube was inter

rupted by the application of an elastic forest in gradually increasing periods of time. When a the surgeon s opinion the blood supply to the tale facthe proximal end was sufficient, the lower end was severed and the so-called delayed flap was placed is proper position to cover the defect in the planter. The proximal end of the tubular flap was placed in the vicinity of the pharyngostomy while the barr end of the tube was placed below the davids mi more to the side than the proximal end. To one the defect, the dastal end of the tube was turned at ward and the upper portion of the tube was ac-tioned. The defect which was produced by form tion of the tubular flap was closed with interrested autores.

Another rectangular flap was prepared from the opposite side of the antenor aspect of the neck, viti, the base at the level of the defect in the plants. The flap was rotated oo degrees so that histered at pointing downward, it lay in a horizontal direction The defect created by the change of the position of the rectangular flap was covered by a translatition of a free flap from the subclavicular report Chromic catgut was used for suturing the tabler

flap to the pharyngeal wall.

JOSEPH K. NAME, M.D.

# SURGERY OF THE NERVOUS SYSTEM

### PERIPHERAL NERVES

Sunderland, S.: The Blood Supply of the Peripheral denand, c.: Live phoof dapply of the Leaping and Nerves; Practical Considerations. Arck. Veur Psychial Chic., 1945 54 180.

Free and extensive mobilization of the nerves, often required in peripheral nerve surgery necessiotten required in perspired nervolve which tates the division of many arterize nervolve which bind the nerve to an accompanying arterial channel. The sacrifice of many nutrient vessels fortunately does not seriously jeopardize the nutrition of the nerve. Nerves are abundantly vascularized the anastomoses are numerous, and there is considerable overlap of supply Experimental work has shown that the collateral circulation of a nerve is efficient even when the nerve is freed from the surrounding tissues over a considerable distance.

The author suggests the preservation of the super ficual longitudinal vessels which lie in the epineurium and anastomose along the course of the nerve and advices ligation and division of the nutrient vessels some distance away from the nerve in order to preserve the vascular anastomoses. Furthermore

Fig 1 Superficial blood supply of the peripheral nerve-

should a large nutrient vessel be torn or divided at the surface of the nerve it may retract into the epi neurrum and cause troublesome hemorrhages which result in damage to superficial nerve fasciculi and the formation of an undesirable scar

Grouge Person M.D.

### BRAIN AND ITS COVERINGS; CRANIAL NERVES

Eaglesham D C.: Radiological Aspects of Intra cranial Pneumocephalus Bril J Radiol., 1945

The author states that head injuries may lead to the introduction of air into the cranial cavity and he discusses its occurrence in 22 cases observed at the Basingstoke Neurological and Plastic Surgery Hospital R.C.A.M.C from July 1942 to April,

The great majority of cases occur in conjunction with fractures through the accessory air sinuses. Nontraumatic pneumocephalus may result from erosion through the paranasal sinuses of a tumor or an infective process. Although gas producing organ isms may be introduced into the cranial cavity with a resultant formation of gases these are considered essential to the discussion especially with regard to the differential diagnosis. Two examples of this one quiestential diskinosis. Two examples of this condition are given in which the underlying pathological process was cerebral abscess

The radiological points favoring gas producing cerebral abocets as contrasted with other causes of pneumocephalus, are (1) the gas is remote from the purcumocephanus, are (1) the purcumocephanus, i.e. the accessory usual source of pneumocephanus, i.e. the accessory sinuses (2) multiple gas pockets are close together and (3) a larger space-occupying effect than the amount of gas would suggest with a pineal shift.

Points favoring intracerebral pneumocephalus rather than gas producing abscess are (1) the presence of gas in the subarachnoid or subdural space in addition to that in the cerebrum, and (2) a rapid appearance or a rapid increase in the amount of gas seen. This, for instance may sometimes occur in traumatic pneumocephalus if the patient blows his nose

Porencephaly may also be confused with pneu mocephalus after an encephalogram has been made. In porencephaly the ventricular shift, if any is to the affected side more gas is seen than was considered to have been introduced the gas pocket is at a distance from the accessory sinuses and there is persistence of the gas pocket after the air is absorbed from the ventricles and the subarachnoid space. Intra cranial lipomas may give a certain radiotranslucence but less than air or gas and in the case of the latter there is not any calcification at the margins. On occasion air introduced accidentally at lumbar puncture may appear in the cranial cavity

From the standpoint of radiological technique, stereoscopic views are always necessary to determine the extent of the shadows. An attempt should also be made radiologically to determine the source of the gas. This involves a study of the nasal and mastold sinuses, with special reference to the cribriform

All of the cases under discussion were of traumatic origin. Only 6 were due to gunshot wounds, the others being so-called closed head injuries which occurred in road accidents. The total number of patients with gunshot wounds, from which the 22 cases were culled, was 814. In some cases the exact origin of the pneumocephalus was not found. Four patients developed meningitis. When the possibility of pneumocephalus exists, radiological re-examina tion may be necessary from time to time.

ADDRESS VERBEDOGRESS MLD

Rodriguez, B., Barrios, R. R., and Oreggia, A.: A New Type of Pedunculate Syndrome. Anterior Nuclear Ophthalmoplegia and Bilateral Cerebellar Syndrome Caused by Teamental Lesion (Un nuevo tipo de sindrome peduncular Oftalmolejía internucieur anterior y sindrome cerebeloso offateral por lexions tegmental) Arch. arug med., 945 7 353

The author reports the clinical history of a 62 year old woman who developed a vascular syndrome of the mesencephalon. The area of softening was located in the peduncular tegmentum. The clinical picture, which had a sudden onset, comprised two groups of disturbances paralysis of the associated ocular movements of a very peculiar type (anterlor internuclear ophthalmoplegia) and a bilateral cerebellar syndrome with dysarthria. In the early stages of the disease there was also a hemiplegia which receded rapidly. Several signs pointed to the involvement of the postenor longitudinal bundle The motor inco-ordination comprised hypotonus, hypermetria, asynergia, and adiadokocinesis.

The authors consider the lesion as belonging to the mesencephalic syndrome and they propose the name of oculocerebellar syndrome caused by a termental lesion. JOSEPH E. NARAT M.D.

Worth, L. H.: Staphylococcal Leptomeningitis Treated with Intraciaternal Penkcillin. Longs. Lond. 1945 449 634-

The author presents the case of a soldier who was admitted to the hospital with a diagnosis of epilepsy A lumbar puncture was done. Ten days later the site of the puncture was found to be infected and an interspinous abscess was opened. Penicillin was given intramuscularly preceding and following the operation, but no benefit was observed.

Almost a months later the patient was again operated upon. At this time an extradural abscess was found and drained through a small laminectomy opening After a period of 4 days obvious leptomeningitis was diagnosed. Another laminectomy with removal of all dead bone, was done. A pocketed

extradural abscess was drained. Cisternal produce revealed cerebral fluid with 11,000 white cells and definite staphylococcus aureus on culture, Large doses of penicillin were given by the cisternal and and the patient recovered

The author reviews the experiences of other is dividuals who have used penicillin either introve-tricularly or disternally. He believes that the coternal route of administration offers adviation over the lumbar route in pyogenic meningen, and discusses the reasons for this.

PAUL MINIEZ, M'D

Blumenfeld, C. M. and Gardner W J.: Di-seminated Oligodendroglioms. Arti. Jam. Psychiat Chic., 1945, 54. 174.

The authors present a case of oligodendroglass which was disseminated throughout the vestrale and in the leptomeninges. The patient was enamed over a period of 14 years during which he madewent a craniotomy twice. At the age of 17 he developed headaches and petit mal-like attacks ad showed signs of dyspitultarism with routers logical evidence of a pituitary gland tomor. Escephalography revealed a dilatation of both himi and the third ventracles, and at operation a thick ened arachnold was found in the remon of the optic chiasm The patient continued to have bests to and attacks, but lost many of his hypopitalization characteristics. Skull films made at the age of the showed calcifications in the tips of both interior horns and in the left posterior horn of the later. ventricles. At the age of 31 he developed to vulsive seizures staxis, hypotonis, and had a in lateral optic nerve atrophy He was then reoperated upon, and a cystic tumor was found posterior and superior to the optic chiasm. The patient died, and at autopsy a tumorous growth was found plasters on the walls of all the ventricles, the aquedut of Sylvius, and the leptomeninges in various area The main portion of the tumor apparently each ated in the hypothalamic region and lad misquently destroyed it. Histological studies proof the tumor to be an oligodendroglioms and to lare undergone mucanous degeneration.

Eleven other cases reported in the literature is which an oligodendroglioms had become deseminated through the cerebrospinal find patient) are discussed and furnish a basis for the opinion that oligodendrogliomas may be pelther as localized as as slow growing as is usually thought

GRORGE PERSON, M.D.

Christensen, J. C.: Tumors of the Third Ventula.

Personal Experience in 5 Once. (Tumors of invor ventriculo)

Bel. Sec. cirs; Cerleis, 1985 286.

The author realises that conclusions draws by him from his experience in 5 cases cannot be grant

ized without a chance of error In one case the tumor of the third ventricle coexistent with an astroblastoms and tuberos acterosis, while in another with an isomorphous glioblastoma, a lymphangioma of the neck, and multiple nevi An intracranial hypertension without major focal symptoms was characteristic for the entire series of 5 cases. In 3 patients paroxysmal attacks were due probably to a transitory blockade of the circulation of the cerebrospinal fluid either in the region of Monroe's foramen or in the cavity of the

The clinical examination revealed disturbances of third ventricle. the ocular motility hypotonus, and binasal hemi-anopais in all cases hypothalmic and mental symptoms were particularly marked in 1 case but were present to a lesser degree in other cases. In I patient a premature puberty and obesity appeared at an age younger than 10 years, immediately follow ing the extrepation of the tumor One patient developed a moderate obesity of adiposogenital charac

In 3 patients an exact diagnosis has been made on ter after the operation. the basis of ventriculographic findings while in the remaining cases encephalography was employed.

In all cases the right transfrontal approach has been used. This type of approach is suitable for removal of all tumors of the third ventricle except those located in the posterior part.

Ventricular drainage according to Dott a tech nique should be employed if a connderable time clapses between ventriculography and the operation or if the surgical procedure is performed in two stages. The drainage should also be employed during and

Only I death could be attributed to the operation immediately after the operation. The author considers operative results in tumors of the third ventracle as satisfactory One year after the operation 3 patients were in a good condition while the fourth noticed a recurrence of the symptoms 3 months following the surgical intervention

## SPINAL CORD AND ITS COVERINGS

Rocca, E. D. and Valladares, H : Injuries of the Spine (Traumatismos del raquis) Arck. Soc. Cirsjenos Hesp Santiago 1945 15 636

The authors report 25 cases of various spine in juries, reviews the mechanism of various lessons, and describes their symptomatology and treatment. Dislocation occurs most frequently in the cervical region, mostly between the atlas and the axis or be-

tween the fifth and sixth cervical vertebrae. In the dorsal region a dislocation is observed most frequently between the cleventh and twelfth dorsal or between the latter and the first lumbar vertebra Dulocations of the lumber spine are rare on account of the firm fixation of the vertebrae.

Fracture-dislocation may be followed by a tear of the venous plexus located in the epidural space, with resulting hemorrhages on the anterior lateral or posterior aspect of the spinal cord. Blood may accumulate in the epidural, subdural or subarach noid space and this may be followed by intraspinal

hemorrhage with a subsequent development of arachnolditis. One of the authors cases illustrates

The most frequent site of fractures of the spinal such a condition. apophysis is the thoracic or cervical portion of the

A fracture of the vertebral arches involves the atlas or the axis in a great percentage of cases.

Fractures of the vertebral body are caused nearly exclusively by an indirect trauma. In this type of fracture a medullary shock or concussion of the spinal cord is frequent and may produce a physiclogical section of the cord with a grave prognosis

Fracture-dislocations of the spine are produced in a great percentage of cases by indirect trauma caused by a hyperflexion or hyperextension.

Injuries by missiles may sometimes create a picture of an anatomic section of the spine while in reality only a physiological section is present. The authors describe I such case in which a projectile produced an irreparable physiological section of the

The degree of disintegration of the white or gray substance of the cord after a concussion depends on the intensity of the nutritional disturbances. This fact explains the appearance of medullary symptoms weeks or months after the trauma

Medullary lesions may be situated at points distant from the site of trauma. For instance, 1 of the authors patients sustained an injury of the dorsal region of his spine and yet the resulting myelomalacta involved the entire medullary tract Hematomy elia or intramedullary hemorrhage, which may be produced by any type of trauma, affects the cervical portion more frequently than any other region of the spine. The original trauma may be transmitted through the column of the cerebrospinal fluid and cause hemorrhages in the gray sub-

Surgical intervention is indicated in the treatment stance at distant places. of spinsl injuries (1) if compression of the cord is demonstrated by the Queckenstedt test, stereoscopic roentgenograms pneumospinograms, and myclograms, (2) if after a favorable evolution neurological symptoms of compression indicate that scar tissue is the responsible factor and (3) if symptoms of compression appear following orthopedic

The authors employ local anesthesia for interven tion on the spine in all cases with very lew exceptions. Tidal irrigation is recommended for the treatment of the cord bladder supplemented by the administration of sulfa drugs administration of sum orthopedic surgeon and collaboration between orthopedic surgeon and neurologist is stressed JOSEPH K. NAEAT, M.D. neurologist is stressed

Guthkelch A. N: The Management of Recent Fracture Dislocations of the Cervical Spine. Bril M J., 1945 2 880.

In fracture dislocations of the cervical spine with cord symptoms, Crutchfield tongs may be applied and the patient may then be nursed in the sitting

position This is the main point set forth in the present article. Seven cases were treated in this way with satisfactory results. There were 4 deaths but these occurred in complete transverse lesions of the cervical cord and the lesions could be regarded as incompatible with life from the beginning

The method is simple and can be applied any where A stout post is lashed to the head of a bed and a pulley is fixed to it the tongs are applied in a line slightly anterior to the pinna a back rest is elevated until the patient is raised up to an angle of 60 the tongs are weighted through the pulley with 18 pounds. Portable x ray pictures are taken in half an hour and if there is no radiological change 4 pounds are added \ ray pictures are taken every half hour and weight is added until the dislocation is reduced. When this happens, from 8 to 12 pounds of weight are applied and maintained for at least 3 weeks then the weight is further reduced for 10 days and the patient is allowed up in a plaster cast.

The sitting position has several advantages (1) gravity is used for traction (2) the upward thrust of abdominal viscera is avoided and this is important in patients who have respiratory difficulties, and (1) the patient is able to look around swallow properly and read These factors promote better results than can be obtained in the usual lying position and they improve the morale of the patient.

ADMICS VERRIOGOREM, M.D.

### SYMPATHETIC NERVES

Wilson, H.: Thrombosis of the Brachial Artery Treated with Successive Cervical Sympathetic Blocks. Am. J Surg 1945 to 155.

Blocking of the sympathetic chain is useful in the treatment of occlusive vascular disease, both of an acute and chronic nature. In thrombosis of a major vessel there is spastic contraction of the collateral channels which further decreases vascular supply to the part. Sympathetic block will relieve such spasm.

A case treated by such a procedure is presented The patient was a so year old soldier whose right arm was pinned to the ground for 30 minutes as the result of an accident. He had a fracture of the left clavicle and contusions of the right chest wall and arm and of the face. The arterial pulse could be felt above the point where his arm had been pinned but not below The right hand was cool and moist the sensory and motor functions in the right arm were both greatly reduced. Since no hematoma was present, it was thought that the patient had a severe spasm of the right brachial artery Three hours and twenty minutes after the accident a right cervical sympathetic block was performed with a per cent procaine. The results were inconclusive Five suc cessive blocks were performed at intervals of approx imately 3 hours. The hand and arm were warmer after each block, but the effect usually disappeared In about \$36 hours.

After 7s hours a weak radial pulse was felt, but this disappeared a days later. Sensation became normal, but the patient had only 50 per cent med the intrinsic hand muscles.

Four weeks after the injury the radial poke an still absent so the diagnosis was changed to time bosis of the brachial artery rather than spena

Procedures now in use in arterial intures in the ligation of a partially severed artery with its cacomitant veln followed by sympathetic process block. Blakemore s nonsuture method of briens the arterial defects is occasionally used but a three bosh or blowout may occur later A procedure some times recommended is resection of part of an arter to interrupt the sympathetic supply dirtil to the resection. However sympathetic block is end-remore complete. The author favors repeated pecaine blocks rather than alcohol became of the sc casional occurrence of complications such as an or neuritis which follows the use of the latter.

The deleterious effect of applying external ket a the affected extremity with the resultant increase

oxygen demand is also stressed.

ROBERT E. GREEK, M.D.

### MISCELLAREOUS

Wolf G A., Jr., Goodell, H., and Welf, H. C. Prognosis of Subarachnoid Hemorrhage, J As M Ast. 1045 180 7 5

In order to formulate a plan of management of patients with spontaneous subarachnoid benoring the authors studied a group of 46 patients from the New York Hospital. The diagnosis of a selandnoid hemorrhage was verified either by postmorten examination operative visualization, or the foliage of zanthochromic and bloody spinal field. There were no differences in sex distribution. The greates number of cases occurred in the fifth decade, the cases being twice as common as at any other pered

Fifteen per cent of the patients had a prener history of migraine headaches, while so per and last noted recurrent headaches. It was noted that the majority of patients were engaged in ordinary activ ity at the time of the rupture and a history of precapitating factors could not be elicited.

It was impossible to correlate the sign and resp toms with the prognosis-either immediate or lite It is of interest that many of the patients whe had recovered had lost consciousness and had carri sions at the onset of the illness. Eleven postnortes examinations demonstrated ancuryous in 5 cast, but no demonstrable source of beeding could be found in 6 of the cases.

By reviewing the current literature and their ers series the authors promulgated the followed per centage probabilities with the first episode of beet ing so per cent of the patients entering the lover die of the survivors 14 per cent die from recures bleeding between the second and fourth with par another 5 per cent die within one year Based upon the previous probabilities and set

cal mortality rates, an excellent management pot

has been formulated.

I Within the first or second week the surgical rak of craniotomy is worth while if the general consists of the patient is satisfactory bleeding has supposed and he ancuryam has been verified by a strainer than the satisfactory of the satisfactory

not used.

2 If after a period of one month there are persistent or residual signs or symptoms artengraphy should be done. Surgery would depend upon visual teation of the aneurysm, its atte, and the status of the patient's general and neurological condition.

If the patient has no signs or symptoms directly in the patient has no signs or symptoms directly terable to the aneuryam after the first month retriography and surgery are optional since the negical mortality at the present time is higher than ungical mortality of conservative treatment. Migraine the mortality of conservative treatment and the mortality of conservative treatment in the mortality of present, should be carefully treated head after the because of the possibility during the medical regime because of the possibility of the mortal decay of the aneuryamal wall from refuter to the same of the same of

peated vasodilatations.

H M and Goldberg Kennedy F, Somberg H M and Goldberg B, R.: Arachnolditis and Parsiyals following Spinal Anesthesia J Am If Arr 1945 129

The authors review many of the sequelae which have been reported following spinal anesthesia, and which involve the nervous system. These symptoms comprise stiflness of the neck, involvement of the revenue for the reck, involvement of the revenue for the

severe neurits septic and aseptic meningitis, arach robiditis, neuritis of the cauda equina and other

onditions
One case is reported in which a middle aged.
One case is reported in which a specifical symptoms approx
female developed neurological symptoms approx
been given connection with a pelver operation.
The price connection with a pelver operation of the lower extremities pain in the back, which proof the lower extremities pain in the back, which progressed upward into the shoulder girdle, and a subsequent development of radiating pain into the hand
sequent development of radiating pain into the hand
is the casal, with increased protein A diagnosts of
the casal, with increased protein A diagnosts of
the casal, with increased protein A diagnost of
a sachnoiditis, secondary to spinal anesthesia, was
a sachnoiditis, secondary to spinal anesthesia, was

made, and a laminectomy performed.

Destructive arachnolditis was demonstrated at about the twelfth thoracle segment. Some improve-

ment followed surgery

A second patient a male of 50 was reported as having adheave arachnoidits following spinal anesthesia, which was localized at the conus meduliariation of the spinal surgery but a major slight improvement followed surgery but a major describitor resulted.

disability resulted.

A third patient, a male of 29 was paralyzed in the A third patient, a male of 29 was paralyzed in the lower extremutes three weeks after a spinal ance-thread, and lammestomy revealed adherent arach thousing a trending from the fourth to the tenth indicates spinal segment. Some improvement in the thoracte spinal segment. Some improvement in the condition of the legs followed but a considerable condition of disability consisted.

degree of disability persisted
The authors believe that a chemotoxic effect of
The authors believe that a chemotoxic effect of
the anethesis plays a definite part in the production
of such symptoms and this is true particularly if
of such symptoms and this is true particularly if
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### SURGERY OF THE THORAX

### CHEST WALL AND BERART

Duany N. P.: Etiological Consideration concerning Cancer of the Breast (Considerationes etiokelosa sobre el Cáncer de la mama). Arch C house Cancer Habana, 1045 4 121

Up to rose it too maliment tumors and 6 coo benish lesions were treated at the Radium Institute in Havana. One thousand and twenty three na tients had tumors or other lesions of the breast. among them being 1 262 malignant and 462 benion tumors. Of 1 262 patients with malignant tumors 1 248 were women, and of 463 patients with benign lesions, 457 were women. Among the benish lesions the following were observed in descending order of fremency fibroadenomas chronic mastitis or functional hyperplasia, cratic mastitis suppurative mastlita, papillomas, schareous cysts, and ownersmastia

Cancer of the breast was exceeded in frequency only by cancers of the uterus, oral cavity and skin.

Cancer of the breast occurred with greatest frequency in the sixth decade of life, to be followed by the fourth fifth and eighth decades in which cancer occurred with anoroximately equal frequency. Then in descending order of frequency were the seventh. ninth, tenth, third, and second decades, other ages accounting only for a very small number of cases

Seventy-eight per cent of the natients with cancer of the breast belonged to the white race 10 per cent were negroes, and 13 per cent were of mixed race. The entire population consuts of 74.4 per cent of white people and as 6 per cent of perroes and those of mixed blood

In the author's material cancer of the breast occurred three times as often in multiparae as in nulliparae.

The relation between trauma and the development of sarrooms can be established much easier than that between trauma and the development of can

In the author's material cancer was found in the nations a mother or father in only a a per cent of the total. Apparently such antecedents are of no great

importance.

The term mastitis, used by older pathologists apparently means nothing but hyperplasia gradually developing in women over 35 years of age. The term "mastitis should be applied only to an in flammatory process. Evidence of such acute and chronic lesions was found by the author in only a small percentage of his material.

He concludes that apparently no relations of any importance exist between inflammatory processes

and cancer of the breast.

A hereditary tendency toward cancer could not be definitely confirmed by the author's observations. JOSETH K. NABAT M.D.

TRACHEA, LUNGS, AND PLETEL

Crafoord C., and Underen, A. G. IL: Moren ed Salivary Gland Tumors in the Branch at Traches. Acta chir scand, 1047 or die

The authors material of so-called brooks) at nomas comprises 14 cases, the tumors being looked to the bronchi in a cases and to the tracks by

These adenomas were demonstrated in below a the group of mucous and salivary shad topon rel like such tumors in other locations, they may be classified as benien semimalument (klasson, Restriwall) and malienant. Of this series a were bones. s semimalionant, and a malienant.

The classification of the tumors in oscilos mucous and salivary rland tumors evolains both the clinical course of the cases and the biological circ-

acter of the fumors.

Tumors of this kind are generally begin, in sometimes they display signs of a certain local interlogical mallenancy by producing infiltration and destruction and by causing metastases. Horoca, the degree of maliemancy generally specan is it

The authors believe that these tumors should be radically removed, if technically possible, as & a difficult to determine their malignancy or semalignancy histologically in excised material. It is known fact that so-called seminallment mores and salivary gland tumors can occarionally change is decidedly malignant tumors in the course of inse.

Abbott, O. A., and De Oliveira. IL R.; Spontages Pneumothoraces Occurring in Patients Cologoing Peroral Endoscopy J There. Ser 1905

There are many common complications of irra choscopy such as the danger of direct injury to the bronchus and underlying vessels, the dangers atten ing local or general anesthesis, and the occurrence subglottle edema. All too little attention has less paid to pneumothorax as a bronchescopic band

Kahler Soulas, and Benjamim have reported instances of pneumothorax or subcutances physema following trauma to the broachts pro which occurred while attempting the removal of foreign bodies. Here the mechanism of the leaber of air into the mediastinum is evident.

The authors are chiefly interested in the our rence of pneumothorax following diagnostic points endoscopic examination. Examination of the little ture revealed only I case similar to the cases reported

in the authors series.

Spontaneous pneumothorax most comment is attributed to the rupture of a subplema taberran focus. Other causes are pueumonia, palmonto gangrene bronchlectasis, hing aboves, foreign bay

empyema tumor congenital cysts, and pulmonary emphysema. Perforating injuries to the chest wall or injury from within the bronchial tree by sharp objects or instruments obviously may produce

Pneumothorax following bronchoscopy may be due to direct injury to the visceral pleura by the pneumothorax. bronchoscopist. However as these patients have duested lungs spontaneous pneumothorax may occur without endoscopic examination. Thoracic surgeons who use the bronchoscope on patients will most likely make periodic fluorescopic examinations and discover unsuspected pneumothoraces. A ma jority of cases have sufficient pleural adhesions to minimize symptoms complicating the pneumothorax. This, unfortunately does not always occur and the complication may lead to dire results unless

The incidence of this complication is uncertain one is familiar with it. since routine fluoroscopies are not done following bronchoscopy The authors 4 cases of pneumothorax following bronchoscopy occurred during a period of 12 months during which 537 bronchoscopic examinations were made on a surgical chest service for disgoods or therapy. No bronchescopic examinations were carried out for the removal of

The authors present 6 case reports In none of the patients was there any evidence of direct injury to ioreign bodies. the major bronchi. In a cases the pneumothoraces occurring coincident to bronchoscopy were asymptomatic and were accidentally discovered by fluor oscopy In spite of the fact that both patients had suppurative lung disease, no empyema occurred In I case the pneumothorax probably was due to the rupture of an emphysematous bleb since these are occasionally associated with patchy atelectasis in children. A similar etiology was suspected in an

In the third case a pyopneumothorax developed secondary to rupture of a weakened necrotic area of other case. a peripheral abscess. This is a spontaneous phenomenon which is likely to occur in these cases. It is a hazard of the coughing paroxyam subsequent to endoscopic manipulation rather than a complication

The fourth patient had advanced tuberculoss and far advanced pulmonary emphysema Either or of the procedure both etiological agents may have played a role during the postbronchoscopic coughing paroxyams. The fifth patient had no postbronchoscopic

pneumothorax, but died as a result of bronchoscopy and the associated coughing attacks. Possibly the explanation may be that in pulmonary emphysema, compression stenosis of the traches may account for dyspnes with coughing attacks however the true

The sixth case described is rare and may be used explanation remains a mystery to support Hammen's theory that spontaneous mediatinal emphysems may advance to the production of a pneumothorax. Two explanations have

stitual bands of connective tissue to the pleural sur face of the lung which ruptures (2) the air in the mediasthum achieves sufficient tension to rupture the thin mediastinal wall into the pleural cavity Most evidence seems to support the second route as

Pneumothorax has many serious dangers attend ant upon it, and a consciousness of this complication the most likely in association with peroral endoscopy should prove ROBLET R BIGELOW M.D.

lifesaving in some instances.

Melick, D W and Spooner M i Experimental Hemothorax. J Therac Surg 1945 14 461

Experimental evidence is presented in support of the theory that blood coagulates normally in the pleural cavity Blood introduced into the pleural cavities of dogs congulates normally Both the liquid portion of the blood and the clot are readily absorbed The liquid portion disappears within from notice the inquire position ansappears within room to to 14 days and the clot decreases in size to such an extent that it may be overlooked. After a weeks have elapsed little evidence remains to show that blood had previously been present in the pleural

The red cells are not laked unmediately after introduction into the pleural cavity. They are rec ognizable after 5 days, although some are fragmented cavity oguinavio airci 3 uayo, airiiougu ayuncaic i raguicineu at that time. The fragmented erythrocytes are taken up by the macrophages, and appear as hemo-

The liquid portion of the blood will not dot, as it sidern within the phagocyte. consists only of serum and cells, and will remain incosgulable indefinitely Fibrinogen added to this liquid portion however will bring about congula-tion. The pleura listel does not elaborate an anticoagulant.

Burlord, T. H., and Burbank, B : Traumatic Wet Lung J Thorse, Surg 1945 14 415

In all wounds of the chest the lung tissue reacts to a greater or lesser degree according to the sever ity and type of the lealon, to produce more than its normal amount of interstitial and intra-alveolar fluid. The bronchopulmonary tree not only has more fluid of which to rid itself but also becomes nore fluid of which to rid itself but also becomes less capable of doing this. The result of these fac tors may be called the "wet lung" of trauma. On tons may be comed the wet times of trauma. On the degree of "wetness and on its recognition and treatment depends the outcome in many cases.

The primary phase of this syndrome finds the patient apprehensive. Dyspnes, accompanied by paroxysms of painful cough, is present. The cough however does not serve to empty the bronchopul monary segments. On examination there is found restriction of motion of the involved side with diminished breath sounds. The outstanding feature is the presence of rales bilaterally but more marked on the affected side. In some instances the patient appears to be having a typical attack of bronchial asthma. In many cases the condition resembles nontraumatic pulmonary edema.

Recognition of the presence of wet lung" should not detract from the importance of other lesions which may be present. The necessity for the proper treatment of these lesions must be stressed

In treating "wet lung' the aim must be to control the preduction of mosture and to promote adequate bronchial dramage. Since pain originating me the traumatized thorace cage structure, at the est important factor in the development of the unfavore able cycle of events, and since the pain interferes seriously with an effective cough mechanism the pain must first be combated. The use of morphine and adhesive strapping is physiologically unusued and ineffective. The use of precaine injections, either at the site of injury by intercostal nerve block, or by thorace paravertebral sympathetic nerve block gives gratilying results which are often directive.

While the abolition of pain and the reinstitution of a painless, effective cough mechanism are essential, other forms of therapy are often also necessary. The bronchopulmonary tree may be flooded. The secretions should be mechanically evacuated by tracheobronchial catheter aspiration. In some cases, atropine given intravenously may be of value. In the more resistant cases, oxygen, delivered at a positive pressure of from 6 to 8 cm. of water is of ben

Traumatic "wet lung" must be differentiated from bronchial asthma, pulmonary edema of cardiac origin, pulmonary edema seen in peripheral vascular failure, and from blast lung Samuri Kann M.D

McDonald, J. R., Moersch, H. J., and Tinney W S.: Cylindroma of the Bronchus. J. Thorac. Surg. 945 14, 445

Six cases of cylindroms of the lung are reported. The clinical course was remarkably similar to that of adenoms of the bronchus, with the exception that in a case the neoplasm involved the traches. The bronchoscopic appearance of the tunn also was similar to that of adenoms of the lung. The lung which is the seat of a cylindroms grossly resembles that in which an adenoms is found in that bron chiectass and lung abscass are common sequelae to the long-standing obstruction produced by the time or Cylindroms histologically presents a different appearance from that of adenoms of the bronchus and seems to be more closely silied to mixed tumors and seems to be more closely silied to mixed tumors.

Valle, A. R., and White M L., Jr t Penicillin in Pulmonary Resection J There: Surg. 945

Pulmonary resection in recent years has become a refined surgical operation with a mortality which is comparable to that of the major abdominal procedures. This development is due to (1) lacreased knowledge of thoracic physiology and pathology (2) progress in anesthesia, (3) increased knowledge of shock and fluid and blood replacement, (4) in creased knowledge of the surgical anatomy of the lungs, and (3) developments in chemotherapy Chemotherapy the most recent development, is contributed to the control of infection of the pron chymat, plearn, and their will. For the list 5 year the sullocamides have controlled potential procuronais and disministed plearn infections. It discovery of penicillin opens a new field in the roll of postopentive plearn infections. When Nicholson, and Stevenson, and D Abre, Lacking, and Scott have all demonstrated the porton value of penicillin in controlling plearn infection. D Abre and his coworkers have above his tended for a long as 3 days wille, conversely its passage first the blood stream into the plearn cavity is saght. In creent article Blades reported that the holden of empyema in a penicillin-protected and own series was about the same

In the present article, the authors compar is course and results in patients with pelanousry a section who were treated with and without its administration of penicillin. The authors dense their technique of pulmonary reserton and strastic problem of drainage and the method of osing be

penicillin.

Preoperatively for a or 3 days, 10,000 with a penicillin were given intramuscularly every flows. This was usually continued postopentively for a 4 days, and over a period of 7 days in kerrity or a minimated cases. Fifty thorsand units of pecific in 10 cc. of sallne were injected into the piral space through a catheter at the completies of the operation. For 6 or 7 days after operation, you units of penicillin were injected daily into its pleural space through the catheter or (after reserved) of the catheter of (after reserved).

This series consisted of 43 consecutive pulmony resections carried out during a period of 31 section the first 25 without penicillin, and the last or silvent penicillin therapy as described. The two pears were roughly similar as to diagnosis and opening

procedure.

In group 1 (without pencellinis of, the state of lobectomies and 3 pneumonectomies, 15 were for bronchiestais, 4 for enemoting 5 for long abscess, and 3 for cyate there were for procedured to the pneumonectomies were for carefords as in far across. Mineteen of the 15 cuts of the

sedered as contaminated.

In group a their were 15 lobectomies and 5 per immorectomies of the pneumonectomies, 3 were instructional of the pneumonectomies, 3 were instructional of the 15 lobectomies, and 1 for telescape tools of the 15 lobectomies, 11 were for breaker tests a for telescape tools, 1 for palmonary of the 15 lobectomies, 11 were for the 15 lobectomies, 15 lobectomie

inated pleural spaces.

In group 1, two of the pneumonectories or uncomplicated, the third patient developed is broachial faintiles with a fath empress. Boards faintiles developed in 10, or 40 per cent, of the principle of the

with pneumonectomy and all patients with lobec tomies developed empyema. Tubal drainage for an

average of 12 weeks was required

Of the pneumonectomies in group 2 all patients had uncomplicated recovenes. Of the lobectomies, none of the patients developed a bronchopleural fistula and only I patient developed an empyema.

Fourteen per cent, or 4, of the patients in group I developed chest wall injections while no case in

The patients in group 2 showed a marked decrease group a was so complicated in days of hospitalization and an earlier day of rhing after operation. The average febrile reaction was slightly less than that of the patients in group I

Aspiration of the chest in group 2 patients on the first postoperative day yielded from 400 to 500 c.c. of fluid. The quantity decreased rapidly and thoracentesis was seldom needed after the seventh day Except for empyema in 1 case all cultures were negative. This was in marked contrast to the com

Three of the patients in group I died-one of mon empyemas in group I these (who had had a pneumonectomy) from an empyema due to a bronchial fistula, another as the result of a tuberculous pneumonia and the third patient, from a suppurative pericarditis secondary to a small basal empyema. One patient in group 2 died as the result of an extensive tuberculous apread

The authors discuss in detail the single case of empyema in group 2 which represents a cure of empyems with penicillin, and without surgical drainage An interesting case of lobectomy (group 2) in which pus was spilled into the pleural cavity is also discussed Here in spite of extensive gross contamination no pleural or chest wall infection

The authors attempt to show the advantage of using penicillin intrapleurally and intramuscularly in pulmonary resection without drainage of the space. They believe that the evidence points to protection of the pleural space from infection by pen cillin Blades reported that 11 of 29 patients who were treated with penicillin developed empyema The difference between these figures and the authors figure of 1 case in 20 probably can be explained by the fact that the authors do not drain the pleural space even for a few days therefore a high concen tration of pencillin can be maintained by daily

Successful bronchial closure is important, but it is not the only factor to be considered in the prevention of empyema. The authors believe that an empyema may contribute to the formation of a bronchial fistula. By maintaining pleural asepsis and maximum re-expansion of the remaining pulmonary tissue, the chances of bronchial fistula are lessened

The clamped-off catheter left in the pleural space serves as a simple means of aspirating fluid during the 48 hours when the patient is most uncomfort able. Its advantages are that the penicillin concentration intrapleurally is kept as high as possible Secondly it facilitates the re-expansion of the

remaining lung by the negative intrapleural pressures induced and maintained by fluid aspiration. Should an empyema develop it is apt to be small,

A striking demonstration of the value of penicillin and recovery rapid. is shown in the heavily contaminated cases in which lung ussue has been divided in the open pleura. Finally, the patient's postoperative course with pencillin, is smoother there is earlier rising and a shorter hospital stay In a larger series of cases the mortality should be consistently lower since the dangers of putrid empyema and bronchial fistula are decreased with the use of penicillin ROBERT R. BIOTLOW M.D.

Adams, W.E. Thornton T.F. Jr. and Cariton L.M. Jr. The Use of Blood Plasma for Filling the Pleural Space following Total Pneumonec tomy Ann. Surg 1945 122 905

In view of the results of experiments on a variety of animals Adams and his associates found it worth while to test the influence of filling the pleural space with plasma following total pneumonectomy in man. Eighteen patients received such treatment and 10 additional patients used as controls, received no plasma. The usual method of management consisted in the determination of the red cell count, hemoglobin value and plasma protein prior to opera tion. At the time of surgery between 500 c.c. and 600 c.c. of plasma were introduced into the pleural cavity at the closure of the thoracic wall and 200,000 units of pencillin were placed in the pleural space of

Between 1 and 3 days after operation, following o of the 18 patients. chest fluoroscopy the remainder of the residual air was removed and replaced with plasma usually amounting to from 200 to 400 cubic centimeters. From the data presented and also from studies as

yet unpublished, it was evident that the greatest drop in red cell count, hemoglobin and hematocrit readings occurred between the third and fifth day after surgery Following this there was a slow return to normal but in most instances the preopera tive plasma protein level had not been reached by the end of the 2 weeks following operation

The lowering of blood plasma proteins was also reatest usually by the third to the fifth day but the fall dad not always parallel that of the hemoglobin In some patients the red cell count and hemoglobin remained at very nearly the preoperative level al though the plasma proteins fell. When the proteins were lowered to from I to 15 gm per cent they usually had not returned to the preoperative level by the end of a weeks following operation.

The average fall for 14 patients who received plasma in the pleural space was 0 00 gm per cent In contrast to this, the average fall for the control group was 1.48 gm per cent or almost twice that of the treated patients. It was seen moreover that a high percentage of the treated patients had only a slight lowering of the plasma proteins and main tained a higher postoperative level than the controls

The incidence of serious complications and the mortality rate were almost twice as great in the control group as in the group which received plasma in the plaural space following resection of the lung.

It is thought that although the series of patients is not large, the discrepancy between the two groups is significant.

A striking difference in the incidence of postoperative empyems and bronchial Sixula was seen
between the methods of bronchial closures. Of the
1s patients in whom as row suture technique was
employed 4 developed an empyems, 3 of whom had
a bronchial pleural fixula. In contrast with this,
none of the 16 patients whose bronchial stump was
closed by a single row suture technique developed
either an empyema or fixtula following operation.
STEPHINA ZURANA MLD

Delmas, J. E.: The Operative Treatment of Fistulous Empjemas following Presumothoras: (Traisminate operatoric de los emplemas fatulizados postneumotocicios) Res espan. cir braunal study 945 5 170.

The author discusses the operative treatment of cutaneous fistules complicating a spontaneous or therapeutic pneumothorax. He performed 7 thor accetomies on account of chronic empyema following pneumothorax. These cases did not include empyems following pleurisy or traumas of the chest. His material belongs to Hedblom's groups 2 and 4. Usually in such cases an encapsulated pleural cavity is found with the mediastinum and the corresponding lung retracted the pleura has lost its ability to expand, the ribs are practically in contact with one another and there is a corresponding deformity of the chest. Multiple listules with surrounding cutaneous ulcerations are present. As a rule the condition is complicated by myocardual degenera tion and visceral amyloidoula.

As to the treatment, extrapleural thorscoplasty cannot always be carried out. To replace thoracec tomy Kirschner suggested intrapleural methods after an anterior resection of the second and third ribs. In selected cases pleurectomy may be per formed.

Schede a extensive thoracectomy is a very scrious intervention which should be performed in stages. Mosaldi suggested a combination of intrapleural and entrapleural methods. Sanchruch performs a para vertebral columnar thoracoplasty on the first to the much ribs in the first stage, in the second stage he removes completely the tenth and eleventh ribs and obliterates the empyems and in the third stage he performs a parasternal resection of the first to the eighth ribs.

The author modified Braun a procedure, which in turn is an improvement of the original Schede method. It is advisable to make the intervals between the various stages of the operation as abort as possible to prevent degeneration of the thoracle wall. As a rule in the first stage is upperfor paravertebral resection of from 3 to 7 ribs is performed. In the second stage a paravertebral columnar merrics of the lower ribs is done and the intercostal space are resected. In the third stage the picurectory is dec-Sometimes the first stage consists only of an extenresection of the first to third ribs with corresponding cartilages in the second stage a paravertend a section of the first to fifth ribs is performed and the intercostal spaces are resected in the third starparavertebral resection of the sixth to the elevent rib is performed and the fourth stage consts of pleurectomy Great care is taken to have the drainage tube in place during the interreston by cause the alteration of the thoracic wall after a resections makes the introduction of a draining the into the old fistula very difficult. The intercencan be done under local anesthesia supplemented by a costopleural bloc.

a costopleural bloc.

The author concludes from his studies that installed the fathloss empyrems without retentes of per a patient in a good general condition can be trustely drainage and aspiration. A residual carly repara limited plaunectomy A frigit carly with considerable pachyplaunita should be treated pleurectomy according to the described technique Pleurectomy about he preceded by an intermediate of the intercental nerves. If the centry is much one stage limited pleurectomy should be performed to the intercental nerves. If the centry is much one stage limited pleurectomy should be performed.

HEART AND PERICARDIUM

Watts, T. D., and Toone, E. G.: Successful Resort of Foreign Bodies within the Periceston.

Surgery 1945 18 685.

Inasmuch as the proper management of longbodies within the persondial asc has remained of definite the authors report a case in which the ptients were treated by successful sampled removal One case of successful sampural removal has been reported previously

It is not intended to recommend, from the pennence with these a case and the 1 pricely reported, that all foreign bodies of the peincelline of the pennence of

 gical removal would seem to be as soon as the cir culatory function becomes stable and the patient s

There were abnormal electrocardiographic find general condition permits. ings in the case previously reported and in each of

In the former these findings were interpreted as the cases in this report. Indicating myocardial damage because of the depth of the inversion of the T waves in Lead 4 and the failure of the patient to show improvement in the weeks of observation following operation. In the latter cases of this report the electrocardiographic hanges were thought to be due to pencardial dam-Ige. In both instances the electrocardiogram showed I return to the normal configuration following the

In addition to the immediate consequences of a foreign body within the pericardum subsequent operation. developments of a serious nature may result. There is always the danger of infection arising at the loca tion of any foreign body particularly when organic material such as clothing is present, as is often the case in penetrating shell fragment and bullet wounds. The adjacent vital structures such as the heart chambers or the great vessels may be eroded or penetrated with serious or disastrous results. JOHN E. KIRKPATRICK, M.D.

### Max, F. H., Awad, S., and Pedrasa C.: Pericarditia (Pericarditis) Res steel Chile 1945 73 833

Of 42 cases of pericarditis observed by the authors 20 were of rheumatic origin 7 were tuberculous in 6 the cause could not be established and 2 followed septicemia 2 uremia, 3 secondary pneumococcus in fection I primary pneumococcus infection and I urems and pneumococcus infection 29 cases were

Of 20 cases of rheumatic pericarditis, 4 developed acute and 13 chronic. in the course of the first attack. Of the 20 cases 15 presented valvular lesions. In 11 patients an exuda tive percerditis was diagnosed, in 4 a dry type, and in 1 patient a symphysis while in the remaining 4 cases the exact diagnosis could be established only at autopay The character of the exudate was establashed by a paracentesis in 2 patients by autopsy in 2 and by clinical and x ray examinations in 7 Of the first 4 cases, 2 had a hemorrhagic scrofibrinous erndate, I case had a hemorrhage and I a sero-

Of 7 tuberculous cases, 6 had signs of polyserositis s of them had an exudative pericarditis, and I had hemorrhagic exudate. an adheave form while the seventh case presented partial constrictive chronic pericarditis.

Both uremic cases had a scrofibrinous exudate. Of a patients with septreemia, I had a hemorrhague, serofibrinous and the other a fibrinopurulent exu

Of the 4 patients with pneumococci r patient had a primary form while a patients had had pneumonia. One patient had a fibrinopurulent exudate the other a purulent the third a scrofibrinous, and the fourth a fibrinous exudate.

Of 29 patients with an acute pericarditis only 1 patient presented a picture of tamponade of the

Of 13 patients with a chronic pericarditis, 3 showed heart.

An elevation of the sedimentation rate was noticed signs of a chronic compression. in the majority of patients with the rheumatic form

They had anemia neutrophil leucocytosis, and a deviation of the blood picture to the left.

The ages of the patients with the rheumatic form ranged from 15 to 40 years that of patients with the tuberculous type from 11 to 25 years, while the age

of those with the pneumococcic form ranged from Of 15 patients with pencarditis 8 showed electro-20 to 65 years.

cardlographic signs of an acute type, 6 those of a chronic type, and one patient had no pathological

Clinically the condition was characterized by the following signs (1) cyanosis (2) dyspnes (3) venous signs whatsoever hypertension, (4) arterial hypotension (5) venous hypertension in the neck and an inspiratory enlargement of the jugular veins (6) edems of the lower ment of the juguist venil of the extremities and in the reclining position also of the chest and upper extremities (7) paradoxical weak pulse and tachycardia as a compensatory phenom enon (8) hepatomegaly and splenomegaly (9) ascites, and (10) cardiac manifestations such as intensified third sound to the left of the sternum, small cardiac dullness, dustolic impulse, systolic depression and

Roentgenological findings are important in exuda absence of the apical impulse.

tive but not in dry pericarditis. JOSEPH K. NABAT M.D.

Ivanisserich, O and Martiarens, L. H : Treatment of the Engaged Heart. Chronic Constrictive or the Editation destroyment consciences remeanurs (transmento de construi spraousco La pericardita crónica constrictiva) Bol Issi

clis. quie B Air., 1945 21 239. The authors operated on 8 patients with chronic constrictive perfearditis. Three patients were cured I patient showed marked improvement in his condi tion, 2 patients showed temporary improvement but death occurred later on and 2 patients succumbed

An intervention should not be undertaken until the primary condition has passed its acute stage to the operation. This statement holds true particularly in cases of tuberculosis of the percardium. Surgical inter vention undertaken to free the heart during the evolutionary stage of tuberculous has proved un evolutionary scage on tubercurant as a part of successful and caused death. The patient developed a bacillary meningitis and died from it. Tuberculous leavons were found in the extirpated pericardium Patients with a marked passive cardiac deficiency

should not be subjected to an operation.

Before the operation an attempt should be made to improve the patient a condition and the cardiac efficiency Furthermore, serous effusions should be evacuated to prevent if possible a new formation of adhesions.

Blood transituous should be given before the operation if necessary Either local or general anesthesis, with cyclopropane or ether given through a trackest the can be used. Any approach with which the surgeon is familiar may be used. Extraptation of the pericardium should be as ample as possible. Total pencardictiony is not always possible on account of firm adhesions which are likely to crist in certain sones between the heart and the pericardium. In such cases which are relatively frequent a partial pericardictiony must be per formed. Experience has shown that many patients have fully recovered after partial extripation of the pericardium.

The authors obtained a cure in 37 per cent of their material. This figure compares favorably with that of other authors who show cures in from 22 to 30 6 per cent of their cases.

JOHEN K. NAPAT M.D.

Shallard B.: Patent Ductus Arteriosus. Med J. Anstralia 945 2 353.

The prognosis in patients with patent ductus artenoms is poor apart from surgical treatment Shallard reports in detail the cases of 14 patients on whom operations were performed. Four succumbed to operation a from hemorrhage and 2 from other causes and 1 died from subsequent infective endocarditis.

In discussing the disgnoss it was thought that there is not one clinical sign which sione can be depended upon as being constant. The nummur described as continuous machinery water wheel, train in-tunnel may not always be found. In 2 of the patients the nummur at the initial examination was limited strictly to systole. The disatolic component developed during a period of observation of 6 months in one patient and during a period of 3 years in another.

X ray pictures are invaluable in diagnosis, but are not pathognomonic. Dilatation of the pulmonary artery was present in only two-thirds of the cases. Left ventricular hypertrophy was found radiologically and a devastion occurred in the electrocardiograms in 4 cases. Significant changes in the S-T intervals in two readings were observed.

Pallor a clinical sign not hitherto described, is considered important, and anginal pain on effort was reported by a adult patients. These symptoms are unusual in patent ductus arteriosus.

STEPHEN A. ZHOMAN M D

Paton C. N: Anothesia in Cases of Ligation of Patent Ductus Arteriorus. *Med. J. Australia* 945 2 362

Basal narcosis with avertin, followed by inhalation anesthesia with cyclopropane was found to be a satisfactory form of anesthesia in a series of cases of ligation of a patent ductus arteriosus.

Cyclopropane was selected because of its nontoxic and nonirritating features, the shallow type of respiration it produces, the case with which "controlled respiration can be instituted, the bit concentration of oxygen in which it is administed, and its reversibility. A standard McKenon in chine was used which is dillitated the application of accurately measured positive pressure.

Endotracheal intubation was an added strategy became a minimum of disturbance of cardae of respiratory function was experienced. Comba those either during or after operation were at prisingly few STEPREY & ZINGY MD

Edye, B. T : The Surgical Treatment of Paral Ductus Arteriosus. Hol. J Antolis, 195

Edye describes the procedure he employs a the surgical treatment of patent ductus arteroses. Se approaches the pathological conditions through a planned space, verified by skiagram to be opporte the second left intercostal area. An oblique poles over this intercostal space was made couring at wards and outwards in the direction of the fiber of the pectoralis major muscle from the margin of the sternum to the line of the anterior axillary ind. The muscle was spht and not divided. In the olde patients a curved incision was made with the covexity upwards to avoid the mammary tome. The pleural cavity was entered by increion of the intrcostal muscles and pleura, and the cartilages of the second and third ribs were divided. The istense mammary artery was sometimes divided between ligatures, but at other times the incision stopped short of it. If it was injured it caused troublesex hemorrhage and delay A rib spreader was inertiover gause sponges and the wound was with opened. A light gause pack was inserted to preter the collapsed lung. The diagnosis was confirmed by the characteristic thrill detected on painties at a near the sate of the ductus. Usually the anatonical structures including the phrenic and vages serve and the left subclevian artery were dearly visit. The ductus joins the nortic arch at or just beyond the level of the origin of the latter This preliment examination completed the mediastinal plean sa divided vertically between the 2 peres. The posterior less was raised to bring mto vice the recurrent nerve which hooks around the sorts in mediately to the left of the ductors, and is a not important guide to the latter The ductus will the located by making pressure over the interval be tween the aortic arch and the pulmonary artery at various points until the thrill was obstrated

The dissection of the ductus was a tedeor paress, fraught with considerate analytic brain was apt to be deficate and easily four. The interdibet ween the acritic arch and the policousty garm was gently widened by blant dissection with securred forceps a little distance to the cyli of ductus, and the process was repeated clear to the ductus until that aspect was freed. I smaller the acciden was carmed out on the opposite rate, it as recurrent larguegal nerve being used as a gable for forceps was then insignated posteriorly so as gast-

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ally to open the interval between the ductus and the and the bronchus behind. It was during this stage of the dissection that the ductus was apt to be torn. The maneuver was assisted by counter pressure with the left index finger in the interval between the aortic arch and the pulmonary artery to the right of the ductus. Narrow malleable copper retractors were a

useful aid in the exposure of the ductus. The next step was the passage of a MacCormick dimector behind the ductus aided as before by counter pressure with the left index finger care had to be taken not to catch the posterior aspect of the fuctus with the instrument. When the dissector had seen passed no attempt was made as a rule to free been passed no attempt was made as a rule to free ductus any further posteriorly, but the distinct now loaded with number 8 silk, was passed and the ligature was drawn through. The ligature distinct the state of t slipped through with greater case when the dissector was in rile. A second ligature was passed. At or about this stage the ductus was compressed digitally and the effect on the circulation was noted. If after I or a minutes there were no untoward effects, the ligatures were carefully but firmly tied. By palpa tion and by auscultation with a sterilized stethoscope, it was determined that the thrill and murmur had drappeared The incision in the mediastinal pleura was sutured as well as possible. Any blood was aspirated from the pleural cavity and the chest wall was closed in layers. The divided costal carti lages sometimes were and sometimes were not mitted with catent. The ribs were drawn together with sharp hooks during the closure of the pleural cavity and the lung was encouraged to expand by he anesthetist and also by suction of air from the pleural cavity before hnal closure. No drainage was provided convalescence was usually uneventful, and only on occasion was it necessary to aspirate pleural fuld. The blood transfusion was continued slowly

It must be remembered that when cardiac ef throughout the operation. ficiency has been impaired it is possible the introduction of a large amount of blood may be detri-

### Gross, R. E.: Surgical Relief for Tracheal Obstruc tion from a vascular Ring. N England J M

In an infant with symptoms of tracheal obstruc tion (crowing inspiration dyspines intercostal and suprasternal respiratory retraction) there developed attacks of superimposed tracheitis, for which the patient was hospitalized on 4 different occasions Fluoroscopic studies made after the patient had a swallow of barlum showed what appeared to be a mass lying behind the caophagus, opposite the third and fourth thoract vertebra, with the esophagus itself pushed forward and narrowed in both the anteroposterior and lateral views. Instillation of liplodol showed a fairly marked narrowing of the traches just above its bifurcation at a level corresponding with the previously described esophageal This narrowing was apparent in the deformity

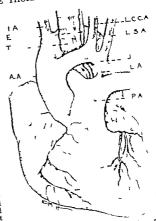


Fig 1 Arrangements of the great yearsels as found at operation. The ascending arts bifurcates into two branches one passes behind the exophagu and the other arches in front of the traches. The two branches join to form the descending torts. Within the vascular ring the coophagus and traches are compressed. AA-ascending commagns and dannes are compressed on satering and Lessophagus IA-immominate artery J-junction sorts companies of the two sortic arches LA-ligamentum arteriosum or the two acrus arenes in hypermentum arteriorum LCCA—left common earotid artery; LSA—left subclavian artery PA—pulmonary artery and T—traches.

anteroposterior view and was particularly noticeable in the lateral film

Operation was then performed at once, although the patient was in a precarious state at the time Under cyclopropane anesthesia the chest was opened through a left anterolateral incision and the pleural cavity was entered through the third interspace with separation of the third and fourth costal cartilages. The left pleural cavity was traversed to reach the mediastinal structures. When the mediastinal pleura was opened the aorta was seen to divide into two vessels which enclosed and greatly constricted the veneza when some and traches and then joined to form the descending norts. The left common carotid and left subclavian arteries came off the smaller anterior segment of the ring in the usual manner for the sortic arch and the much larger posterior segment gave

First the ligamentum arteriosum was divided beissue to the innominate artery tween silk ligatures to allow the pulmonary artery to fall forward and away from the traches this procedure did not have a marked beneficial effect on the

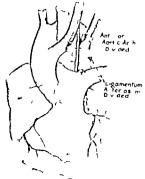


Fig. Surgical procedure. The ligamentum arteriorum was di ided to llow the pulmonary artery i displace forward. The aterior arch of the sorta was di ided t relieve compression of the traches.

respiratory exchange and the anterior segment of the ring was then divided between the two branches

he soon as the anterior acrtic such had been di yided the respirations quieted down most of the crowing disappeared and the respiratory shift in the mediastinum diminished to a normal degree. The chest wall was closed in an appropriate manner the left lung being compl tely expanded before final repair of the wound and the patient was placed in a steam room and given sulfadizzine and penicillin

After 1 week the patient was alert and playful and had no distress of any kind. When the car was held close to the chest a faint inspiratory sound could be beard during and immediately following degintition of food these inspiratory sounds became slightly louder apparently because the esophagus was still displaced forward by the sortic arch behind it and was causing some pressure on the posterior

Roentgenographic examinations 1 month later showed no change in the esophagus, and the traches still presented some narrowing above its bifurcation but this was distinctly less marked. Although its left border had straightened out considerably there was some indentation along its right side perhaps due to some residual pressure from the left common carotid artery which was now passing across the traches from in front, or due to incomplete development of the trachesi ring following the longitudes

a scular rines of this nature do not always the rise to important clinical symptoms but sing the compression of the traches is areat enough to rive tree to respiratory distress, surgical division of surportion of the ring should offer an excellent dans for relief of the symptoms.

TOWN TO DREVELY, M.D.

### ESOPHAGUS AND MEDIASTINIA

Lam C. R.: Surgical Treatment of Coopulat Atreda of the Esophagus. J. Palia. 5 Iai,

Until Leven in 1010 reported that a child had survived the serious preliminary operation of a multiple stare procedure for conrental stres of the esophagus, and that if an antethoracic skin tale could be constructed the case could be called in ces ful the outlook for the child born with a obstructive defect in the esopharus was hopden

The indirect method, however had may deadvantages and it soon gave way to the openton

of direct anastomovis.

L'ophareal atrenas may be classifed as folion type 1 in which there is complete absence of the esophagus (rare) type r in which there is an upper and a lower segment ending in blind nonche (ale rare) type 3 in which one or both of the segment communicate with the traches or bronchus. Type; is subdivided into type 1s, in which the fatels s between the upper segment and the tracket, type 3b, in which the natula is between the lower segment and the traches and type 3c, in which bets arments communicate. Type 3b is encountered non frequently than all other types combined and at counts for from 80 to 00 per cent of all congestion atresias of the esophagus.

If a newborn infant has a tendency to choke on as own mucus or is unable to take feedings, marthe roentgen studies should be carried out and if a cagenital lesion is present, its type can be determed

with considerable certainty

For a successful operation, three objectives are order (1) provision must be made for feeding the infant (2) regurgitation from the stomach through the lower segment into the traches and brocks tree must be prevented (1) the blind poets of the upper segment must be opened to allow the escape of swallowed salva. These requirements would be set by gastrostomy ligation of the lower cooksen segment and marsuplalization of the apper posch With these three procedures completed, the star tion would be compatible with life, but permanent gastrostomy feedings would be necessary unless at antethoracic esophagus could be constructed (o the other hand, the operation of direct anatoms meets at once all the essentials for the establishment of normal functional and anatomic conditions.

Most or all of the operation is performed union local anesthesia. A transfesion of approximately 75

c.c. of blood is given through a cannula inserted in an ankle vein. Access to the posterior mediastinum is gained by exposure of the vertebral ends of the second through the sixth ribs, subperiosteal resec tion of short lengths of these ribs section of the third fourth and fifth intercostal bundles, and areful reflection of the parietal pleura from the ertebral column. It is necessary to ligate the trygos vein on the right or the upper two or three intercostal arteries on the left, to open up the space behind the traches where search will be made for the datal segment. The upper segment is identified by the palpation of a catheter which has been introduced through the mouth The lower segment is then located and ligated as close to the trachen as possible It is cut transversely distal to the ligature and a corresponding opening is made in the blind upper segment. End to-end anastomosis is per formed over a catheter and with the use of fine silk in dural or eye needles. If no distal segment can be found or if after ligation the segment is too short to be connected with the upper one, resort to an in

Immediate postoperative care consists in an direct method is made oxygen tent incubator, extreme vigilance in the aspiration of secretions from the pharynx and noth ing by mouth for 5 days parenteral fluids being administered by hypodermoclysis On the fifth day if inspection of the dressing shows no leakage of mucus from the wound cautious feeding by mouth is begun. One-half ounce of 5 per cent dextrose solution is offered every two hours. If there is no regurgitation or evidence that the anastomosis is not intact this amount is gradually increased to a ounces. On the seventh postoperstive day I onnce of formula is given every a hours. If this is toler ated all restrictions on the feeding of formula are removed after the tenth day Vomiting should be avoided for it would undoubtedly put strain on the

Scott W J M : Idiopathic Dilatation of the anastomosis Esophagus, Ann Surg 945 122 582

Today it is recognized that dilatation of the sophagus without obvious pathological cause is a numon condition. In fact it is approximately one hird as frequent as carcinoma of the esophagus, being second only to the latter in the statistics of the hrger clinics (MacMillan) It appeared earlier in the literature under the purely descriptive term, ectasts or idopathic dilatation of the esophagus. But today the author's etiological conception is usually introduced into the name, and the condition is most commonly designated as achalasia of the cardla or cardiospasm although there are still widely conflicting opinions about the cause of the dilatation

Fortunately for the patients who suffer from this serious and usually progressive difficulty in the passage of food from the dilated esophagus into the stomach, treatment does not need to wait for a final determination of the cause by dilatation of the

cardia, either on one or repeated occasions, the symptoms in the majority of cases are adequately con trolled However some of these patients do not respond satisfactorily to this and the other conserva tive measures of treatment. Although the percentage of this refractory group is small, the failure to re spond to conservative measures offers a serious problem for two reasons first, because of the complete failure of the usual therapeutic measures to alleviate the condition and, second because of the progres-These cases sive seriousness of the symptoms constitute a small but important group and their relief has become a challenge to the general surgeon

as well as to the esophagoscopust Dilatation of the csophagus without any clinically discoverable obstruction is not a disease entity but a syndrome. At least four clinical types can be recognized each with a different ethology namely (1) achalasia of the esophagus, (2) true cardiospasm (3) partial constriction near the cardia, and (4)

Achalasia is probably the most common type. It dolichoesophagus usually responds well to dilatation. In true cardiospasm the reflex originating focus should be discovered and removed Those cases caused by a

partial constricting band near the cardia are few in number but are probably resistant to conservative treatment. Dolichoesophagus, an S-shaped length ening with pooling of esophageal contents at differ ent levels, should probably be operated upon difficult to control when the dilatation becomes ggantic and a complicated by infection of the

Subdiaphragmatic esophagogastrostomy of the esophageal wall. Finney pyloroplasty type appears to be the opera tion of choice in the cases of idiopathic dilatation of the esophagus that are resistant to the usual con servative measures. The symptomatic results of this operation are usually excellent whether or not the dilatation of the coophagus is entirely corrected The danger of the operation is not excessive when proper precautions are taken. After this operation has been employed more extensively the number of cases in which it is indicated will probably be con sidered as having increased but it should never replace conservative dilatation in the majority of CASCS.

Olsen A M O'Leary P A, and Kirklin B R.; Esophageal Lesions Associated with Acroscleroand Scieroderma. Arch. Int. 11 1945, 76

Approximately 10 per cent of the patients suffer ing from acrosclerosis or scleroderma made complaints referable to the esophagus. The most common complaint was dysphagia. there was also substernal burning after meals, especially when the patient was lying down

Positive roentgenographic or endoscopic findings were demonstrated in 18 cases. Dilatation of the csophagus similar to that seen in cardiospasm was observed in 7 cases and hiatal hernia with intra thoracic stomach was demonstrated in 9 cases. In 2 other cases scierodermic changes were demonstrated in the esophageal wall.

Acrosclerois should be distinguished from other forms of scleroderma. In acrosclerois the phenomena of Raynaud's disease are present prior to the demastological changes or coincident with them Thirty three of the 35 patients who had esophageal symptoms presented the clinical syndrome of acrosclerois. All of the 18 patients who had positive roentgenographic or endoscopic findings had acrosclerois.

The basic alteration in acrosclerosis and scleroderma is sclerosis of the connective tissues of the body Sclerodermic changes in the connective tissues of the esophagus are chiefly responsible for the esophageal disturbances. It should be emphasized that esophageal disturbances are extremely uncommon in Raynaud a disease per se Reduced or absent muscular activity in the wall of the esophagus and shortening of the exophagus apparently result from sclerodermic involvement. Disturbances of the autonomic nervous system may play some part in the causation Clinical diagnoses of cardiospasm and hiatal herms of the short esophagus type are made most frequently in these cases. Stenosis of the lower part of the esophagus and the esophagugastric junction may occur with histal hernia as the result of chronic inflammation of the lower part of the esopha gus. This inflammation is the result of incompetence of the cardiac sphincter with regurgitation of the mastric secretions.

The treatment of the esophageal lesions of acroscleroils consists of the passage of sounds over a previously swillowed thread Fairly satisfactory results have been obtained. The esophageal stenosis of 1 of these patients was treated satisfactorily over a 10 year period by repeated dilutations.

### Clark, D. E. and Adams, W. E.: Transthoracic Esophagogastrostomy for Benign Strictures of the Lower Esophagus Ann. Surg 1945 2 942

Clark and Adams report in detail 5 cases of trans thoracic exophagogastrations for beingn attricture of the lower exophagus. None of the 5 patients was considered to have cardionasm. In 1 case the stricture followed the ingestion of lye, in another it was associated with generalized scienoderms, and in 3 cases there was no ethological factor that could be ascertained. In all of the cases however the obstruction either started above the disphragm, or the entire lesion was in the thorax, so that transabdominal cardioplasty was out of the question.

Four of the patients had repeated dilatations with only temporary relief and z of these required guatrostomies when dilatations became impossible. The fifth patient because a malagnancy of the cardia was anspected was not subjected to dilatation.

Employing positive pressure ethylene-oxygenether anesthesia the authors opened the chest through the eighth rib bed in 4 cases, and through the eighth interrpace in r case. After proper a tractions of the long and extralor of the power nerve, the displangum was included from the power toward the esophagent hatrus. The piece use moved to facilitate mobilization of the storest celthe fundas was brought up late the therat was earth of the sorts. The anastronesis yet was the just above or at the upper level of the tritings and just above or at the upper level of the tritings and side to side anastromosis was made. The displangwas closed about the stomach and snirred is a wall. The wound was closed thirty

All of the patients made an unevential reason and are still alive and enjoying a normal cristor. It is concluded from these selected cases of he

It is concluded from these selected cases of isnign stricture of the lower esophagm that tenthoracic esophagogastrostomy offers the pairs complete rehed without the necessity of dishinant the unpleasantness of the gastrostomy

STEPRED A. ZITTA U. N.D.

#### MISCRLLANEOUS

### Donovan E. J.: Congenital Diaphragmatic Bank. Ann. Surg. 1945, 122, 569.

In reviewing the literature of the past 10 years congenital diaphragmatic hemis, one is improve by the number of single cases reported by vacuo authors as well as by the series of cases reported by Harrington, Ladd and Gross, and Hartrel and Truesdel. Many of the infants were operated son successfully at an early age. It is obvious from ther reports that the diagnosis is made much earlier an that operative treatment has made great progres b recent years. In 1925 Hedblom reported that I per cent of the infants with congenital heris & before they are I month old In 1938, the artist reported to cases from the Bables Houses, ver York, 6 of which had been operated upon. The pe pose of this article is to review the surpleally train cases of the first series, add to their follow up, to report 11 additional cases operated upon since up

report it additional cases of the first a first and the most common congenital defent a findaphragm are, in order of their converse, if exophageai histus, (3) foramen of Borbird, it foramen of Morgagui, and (4) defects in the dar Hermas through the vena caval or sartio constraint the duaphragmy have never been reported.

The symptoms of disphragmatic terms only either circulatory, respiratory granter terms of a combination of all three. They are due to present call interference with the function of the beamed structures or to interference carculatory organs upon which the leminal carculatory organs upon which the leminal carculatory organs upon which the leminal or three carculatory organs upon which the terms of the three carculators or the carculatory or the carculators of the carculators of the carculators or the carculators of the carculators of the carculators or the carculators of the carcula

quite irequently by the spicen and same Surgical repair of the bernia should be adved immediately for all cases in which either the sold large intestine is in the chest became of the dropt of intestinal obstruction. The author prefer for

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abdominal approach through a subcostal incision with exposure of the phrenic nerve in the neck 48 bours before repair. Many surgeons prefer the thoracic approach. As a rule there are no adhesions in the chest and the structures are easily reduced in the chest and the structures are easily reduced in the chest and the structure are easily reduced in the operator places a retractor in the diaphragmatic fect and equalizes the pressure in the chest and

odomen before he tries to reduce the structures In 3 cases of this series there was a large opening nth no attachment of the disphragm to the poster or chest—these were probably cases of deficiency of the diaphragm In these cases a row of silk sutures was used with two needles on each they were passed through the diaphragm to the outside of the chest wall, one on either side of the adjacent rib and tied over a piece of gauze. Because of the deficiency of reparative material in these cases, the row of sutures attached the diaphragm at a higher level in the chest than normal in closing the defect A second row of continuous or interrupted silk sutures were then used to attach the edge of the disphragm to the pleurs and intercostal muscle. In any type of closure a catheter is placed in the chest and the air is

Positive pressure or intratracheal anesthesis are very desirable. All patients should be kept in an oxygen tent for several days after operation oxygen tent for several days after operation. Pleural effusion may occur and aspiration should be done as necessary.

John E. Kirkyazaick, M.D.

Grez, A: Two Cases of Mediastinitis Caused by Perforation of the Ecophagus and Treatment Perhodilin Recovery (Dos cases do mediastinitis por perioration esolastica. Tratadas con penticilina. Curación Rev suel Chile 1945 73 970 Rev otorrinolaringol. 1945 5 115

The customary treatment of mediastinitis caused by perforation of the cooplagus consists of media is stinotomy especially if the perforation is located in the upper exophagus, while a partial resection may be indicated in crave cases

be indicated in grave cases

A perforation of the esophagus may be due to a
verification of the esophagus may be due to a
verification of the esophagus may be due to a
verification of the esophagus may lead to a perforation or
ulcer of the esophagus may lead to a perforation or
the latter may be due to a traumatism in the course
of esphagoscopy A violent spasm provoked by an
attempt to extract a large foreign body through an
attempt to extract a large foreign body through an
esophagoscope may be followed by a perforation.

If a perforation occurs in the crevical portion of the exophagus pain develops at the base of the neck the stopping pain develops at the base of the neck the perforation involves the thoracie portion of the scophagus the pain is confined chiefly to the region between the acapulae, and the respiratory move the perforable perforation occurs in the distances pain. If the perforation occurs in the distance pain if the perforation occurs in the distance pain in the perforation occurs in the distance pain in the presence of the second painting the presence of an acoustic bacteria in the sputum and lever are other important signs

The author treated an 18 year old girl who de veloped dysphagia following the ingestion of 10 c.c. of nitric acid. Two months later roentgenograms showed a cicatricual atenoals of the esophagus of caustic origin. The entire esophagus was rigid and stenosed On esophagoscopic examination a stenosis was encountered at the upper aperture, and sounds, from size 12 to 18 were introduced through Jack son a tube. The patient's condition improved but she returned 9 months later with intensive dysphagus Sounds from size 12 to 14 would pass only the upper portion of the esophagus and roent genographic studies confirmed the diagnosis of a high stricture. Dilatations of the esophagus were continued for 11 days Two weeks later the patient returned with a more intensive dysphagia and edema and pains in the left side of her chest. The pains were radiating toward the left upper extremity and the left side of the spine. Gastrostomy was planned in order to facilitate alimentation. X ray studies revealed a homogeneous, sharply circum scribed shadow in the upper mediastinum especially on the left side. The esophagus in that region had irregular outlines and a retention of barium was noticed 24 hours after its ingestion. The roentgenological diagnosis was mediastinal abscess of esopha geal origin with a suspicion of pulmonary abscess on the left side. Twenty thousand units of penicillin were given every 3 hours in addition to a blood transfusion. The temperature returned to a normal level after 48 hours and the pain disappeared com pletely after the administration of 1 000 000 units of peniciliin. Five days later x ray studies showed a complete disappearance of the mediastinal lesion it was believed that this lesion might also have been of

The second patient, 33 years of age had been complaining of epigastric pains and complete dysphagia for 4 years. The attacks used to come in the form of crues during which the patient was not able to swallow even his saliva. Gradually the attacks returned at shorter intervals so that at the time of admission hardly a day was passed without attacks Roentgenographic studies revealed a contraction of the crophagus at the junction with the cardia. An esophagoscope 7 by 45 could not pass the stenosis A dysfunction of the diaphragmatic histus with a resulting spastic condition of the csophagus was diagnosed and a mercury sound was passed. The procedure was repeated for 4 days. When the cophagoscopic examination was repeated a con tracture was encountered at the crkcopharyngeal level. The esophagoscope was withdrawn but in spite of careful technique the patient developed pain in the neck, especially on the left side frequent pulse, and a rise in temperature Roentgenographic examination disclosed a sharply circumscribed bomogeneous shadow in the upper mediastinum The clinical and roentgenological diagnoses were mediastinitis due to a perforation of the esophagus. Thirty thousand units of penicillin were given intra muscularly every 3 hours, in addition to a hypoder modysis of glucose in saline solution. The following day an edema developed in the left lower curvact region and the frequency of respirations rose to go per minute. The pain was redaring to the left side of the cheat and the left supraclavatular region. Only after 72 hours the fever panu, drypnes and other symptoms began to subside and it desappeared completely to days from the time the treatment had been instituted. The total amount of penicilliar given was 1,00,000 units. A gastrostomy was performed to facilitate the administration of food and retwormed dilatation.

The author atreases the point that in spite of a large experience of the esophagoscopht and extreme care, fissures of the esophagost wall may follow dilatation of the exophagost. A necrosis of the mu cosa gradually leads to the formation of a fistual with resulting mediastinitis. Blood transfusions and the administration of other fluids intravenously should supplement the administration of pencellin in such cases.

Forsee J II: The Use and Control of Thoracic Surgical Teams of an Auxiliary Surgical Group J Thorac Surg. 1945 14 425.

An auxiliary surgical group composed of a group headquarters, general surgical orthopedic, neurosurgical maxillefarial, thorace surgical, shock gas, and dental proathetic teams has been employed in the American Army for the first time during World War II

This organization under one central control group has produced a maximum level of competence and economy in the deployments of specialized surgical taient. Remarkable advances have been made in thoracic surgery since World War I and thoracic surgery since World War I and thoracic surgery since World war I may be supported to the first time in this war. The author a study is based on 13 months of experience caring for 2000 patients with thoracic luturies.

Thoracic surgical teams are composed of a thoracic surreon, an assistant surreon an anesthetist a surgical operating room nurse and 2 enlisted surgi-cal technicians. The chief surgeon should be a competent operator preferably with a sound basic training in general surgery, a good teacher and should have a thorough knowledge of surgical physiology of the thorax. The assistant surreon should have a minimum of a years of survical train ing with some experience in the medical aspects of thoracic diseases. The anesthetist should be expert in endotracheal and positive pressure anesthesia in bronchoscopic aspiration of secretions the management of shock, and in the recognition and treatment of disturbed cardiorespiratory physiology nurse should be an able instructor in operating room technique able to teach the principles of asepsis to soldiers without previous experience and have a knowledge of the technical features of the specialty All team members should be sincere, have physical stamina, and the ability to adapt themselves to varied and changing situations.

The teams work in many different hospital are supplement the regular staffs when the requirement for survery exceed the canacity of the tender of

The equipment is minimal and consist of the army basic instrument set, and a supplement thoracic set including a bronchoscope and sunsories. An electric suction apparatus and purish anesthesia equipment complete the list.

The thoracie surgical teams are employed is a war for the thoracie surgical teams are employed in the woulder those who cannot be transported here woulded those who cannot be transported here to the real field supplied to the real field of the surficial cleans of an antiffure surgical case.

the surgical terms of an auxiliary surgicity surgicity. It is here that surgical care can be first assisted. These bospitals are located in the rear of striken area and in dose conjunction with a Grassic clearing station. The platoon of a field sopiule capable of moving on short outer as they from one another. The platoon, or part of k, bit behind and becomes a holding end. When after patients have been extracted, in from a to so we the unit is available to kep frog another place and become the forward hospital.

An active platoon requires 1 general seried, thorace, and 1 shock team. The thorace said team not only operates but also shrine in but an agement of thorace wounds and teacher broad scopy to aneithetists and surgross. The thorace surgross a interest in interestal nerve block per diversity to be a surgross and the surgross and the surgross and the surgross and the surgroy catheter application of trackers child secretions, the management of istalisated foreign bodies, and traumatic hemothesis the set assimulas to all surgross treating severe thank records.

Certain types of cases which were considered for priority surgical problems, in the fight of entitherapeuthe measures perclosely enasoried is requestly transportable, and inmediate reports no longer considered necessary one tonger surgical team, however during a period of year, operated on 92 intrathoracic conditions, of with operated on 92 intrathoracic conditions, of with were combined thoraccolodomial womas, to thoracotomies and 56 were penetrated or forating injuries. At the same time this proforating injuries. At the same time this proportated on 44 palents with abdominal womas.

First priority surgical cases represent only for cent of the total cases arriving at the draw, the station. The majority are to tensated to the evacuation hospital a few mines ponely begins about 25 per cent, and anything less small cates an improper selection of cases.

The overall mortality rate in 346 intra-abdorbal wounds (20 per cent of which were combined the acoshdominal wounds) treated by surgeons of this group was 30.6 per cent. Pulmonary complications caused 27 per cent of the deaths, while peritornize was responsible for only 11.4 per cent. Another series of 256 intrathorated wounds with 43 per cent thoracoshdominal injuries showed an overall mortal try of 28 per cent.

These figures indicate that most patients were wounded with high explosive shells, and that the highest percentage had multiple major wounds. Thoracic surgical teams working at this level must be connected to do major abdomlinal surgery.

The surgical teams of an auxiliary surgical group have done much to develop the phase of forward surgery. They have exerted a remarkably favorable influence on the morale of combat troops and have eliminated the temptation for clearing and collect ing companies to indulge in herore surgical procedures which they were never designed or equipped

to carry out.

The evacuation hospituls, located from 3 to 15 miles to the rear of a first priority surgical hospital, treat oper cent of the casualties from the divisional classification of the casualties from the divisional classification. The percentage of abdominal and combined thoraccabdominal injuries treated here. An appreciable segregation of cases into the surgical specialties is practical. In such 400 or 750 bed installations, thoracci surgical teams have been useful to supplement the regular thoracie surgeal section or furnish qualified person held for qualified thoracies surgeon is on the regular staff. It is highly desirable to have 2 thoracie surge at teams functioning in an evacuation hospital and devoting their attention to the treatment of patients with major thoracie intures.

In quiet periods at the front when there is no need for beds for imminent battle casualties, certain surgical procedures such as the removal of intra pulmonary foreign bodies and pulmonary decorties ton for oreanizing hemothorax are undertaken.

In fixed installations station or general hospitals in the base section area, the thoracic surgeons have a real opportunity. Every effort is made to return the patients to duty within oo days. This policy has led to several noteworthy contributions the removal of intrapulmonary foreign bodies within 10 days to 3 weeks after injury the radical management of massive organizing hemotherax by thoracotomy evacuation of the clot, and decortication of the lung The same procedure applied to established post tranmatic empyema with penicillin therapy as an adjunct has led to immediate healing with a fully expanded lung. This has been one of the significant advances in the surgery of World War IL. To the thoracic surgical teams of an auxiliary surgical group goes much of the credit for these advances The use of thoracic surgical teams in fixed in

stallations often has permitted the completion of the reparative phase of surgery by the same surgeons that have dealt with the initial phases of wound

management in the forward hospitals.

The organization of a large number of highly trained surgeons into aurical teams under one central control was new and untried several years ago Few hospitals considered the need for the assistance furnished by such teams. However, today the usefulness of such an organization is fully recognized and appreciated by all who have first hand experience in the problems confronting the medical science of an active theater of operations.

ROBERT R. BIGELOW M.D.

### SURGERY OF THE ARDOMEN

#### ARDOMINAL WALL AND DEDITOREUM

Brandon, W J M: Inguinal Hernia; The New Muscular Internal Ring Lener Load. 945 240 8 2

The author points out that the only common factor in the various types of hernia repair is the retention of the original muscular internal ring. Closure of this ring when the cord and testicle are removed has proved uniformly successful. The conclusion is drawn that the internal run is the potential source.

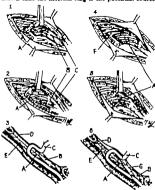


Fig. 1 A, Incision of internal oblique and transversalis muscles B conjoined tendon C, spermatic cord.

Fig. 2 A, Incised muscles reconstituted to form new

source of conjoined tendon to Poupart ligament.

Fig. 3. A, Portions of Internal oblique and transversalis nuncies satured medial to cord B satured confolored tendon D transversalis fascia E, lateral portion of internal oblique and transversalis muscles.

Fig 4. A, Internal oblique and transversalis muscles incised F muscles separated in the line of their fibres. (Spermatic cord omitted.)

Fig. 5. New muscular internal ring full constructed. Fig. 6. A. B. (astured cooledned tendon). Anterior blade of shutter giving full protection to true internal ring: C. spormatic cord enserging from new muscular internal ring after taking an S-shaped bord. D. transversalls facula forming posterior blad of shutter and protecting new full results of the shutter of

of weakness and that all recurrent hernias may be shown to involve the internal ring

A modification of the Rassini renair is described in which the essential feature is the construction of a new muscular ring. The internal oblique and transversus abdominis muscles are incised so as to form a V" at the old internal ring This muscle is then sutured about the cord to form a new ring as shown in Figs 1 2 and 4 A slightly different technique in which the fibers of the muscles are sollt at the anex of the "V" to further move the internal rine from its original position, is shown in Figs. 4 c and 6 In this way the obliquity of the emergence of the spermatic cord from the abdomen is changed and made more angular. There is then a two bladed "shotter" over the internal ring-one the transversalis fascia, another formed by the new mucular ring, and both permanently closed and not in opposition to one snother

The author concludes that for the moment this new suggestion in the repair of inguinal herns is a thesis and that proof of its efficacy must await the test of time.

Throws C. Downess M.D.

#### GARTROINTESTINAL TRACT

Cancino, A. The Arterial Circulation of the Stemach. Gastric Hemorrhage (Circulación arterial del estómago. Hemorragia pistrica) Res Gatresides ous 10 ot

The author removed the stomach and the adjoining part of the decoleram from calavers, preserving all the attricts. Specimens were obtained from fresh cadavers to avoid maceration of the tissue. The main arteries were injected with a radiopage substance and roentgenograms were taken. In this manner the author studied the distribution of the blood vessels in normal stomachs and in those with peptic ulexar.

he came to the conclusion that there is a perfect equilibrium between the arterial pressures of the main arteria. Various factors collaborate in the regulation of the pressure velocity, and quantity of the blood passing each branch. One coal expect that a peristalite contraction might produce as anomic zone because of the compression of the blood versels, but in reality this is not the case. The diretion of the main arteries is identical with that of the peristalite waves, which facilitates the blood flow Numerous anastomises also contribute to the maintenance of a continuous blood current.

The diagnosis of the origin and mechanism of a grave gastroduodenal hemorrhage is of paramoent importance in the selection of proper treatment, namely the choice between a pure expectant treat ment, active medical therapy and surgical intentition. The gravity of anemis must be determined by a study of the blood pressure pube blood count, and the amount of hemoglobin The determinations of pulse and arterial pressure are of limited value be cause shock may produce a similar picture. Therefore the blood count and determination of the amount of hemoglobin are of greater value. A grave hemorrhage in the stage of evolution produces a pulse of gradually increasing frequency and an arterial pressure which gradually falls. On the other hand shock is followed by a fall of the blood pressure which remains stationary for a time, but gradually returns to normal levels in favorable cases.

A grave hemorrhage causes a progressive diminition of the number of red blood corpuscles. As a rule, an acute hemorrhage responsible for a fail of the number of erythrocytes to 3 000 000 within the first 3 hours gives a very grave prognosis. A red blood count of as little as I to 2 million is compatible with life, while in chronic anemias the organism may survive a count even lower than 1 000 000 crythro-

cytes

An amount of hemoglobin lower than 30 percent is not compatible with life and therefore a fall of hemoglobin to between 40 and 50 per cent requires a blood transfusion.

A pulse frequency between 130 and 150 gives a serious prognosis and a systolic pressure between 80

and oo is also alarming

While laboratory examinations furnish information as to the gravity of symptoms clinical examination should attempt to establish the cause of hemor rhages. It must be remembered that varnous conditions may be responsible for a gastroducdenal hemorrhage, e.g. ulcers hemophilia gastror varicustities, venous hypertension caused by a cirrhosis of the liver blood dyscrasias caused by choleli thissis primary or secondary gastric hemorrhage produced by Bantis disease syphilis of the stom ach, cancer and congestion within the stomach wall caused by retention due to pyloric steroois

Hemorrhages from capillaries or precapillaries are benign, as a rule, while those from larger blood

vessels require a surgical hemostasis

If conservative treatment is decided upon an schag should be placed in the dorsolumbar region, and not over the epigastrium because the vasoconstricting reflex of neurogenic origin can be atumulated casier in this manner. Liquids should be given hypodermically in preference to their intravenous administration in order to avoid an overloading of the circulatory system. The amount given depends on the quantity of lost blood the condition of the pulse, and the blood pressure. The amount of blood to translused also should be related to the amount of blood both.

In chronic anemia a relatively small amount of transfused blood may raise the blood pressure but this is not the case in patients with an acute hemor thage who tolerate large amounts of blood without a rise in their blood pressure. A few days may clapse before the blood pressure returns to normal limits after a transfusion of relatively large amounts of blood. A patient with 3 000 000 ery torrocter a collection of the coll

hemoglobin of 60 per cent, and a systolic pressure of 100 requires larger amounts than 400 c.c. of blood

Vitamin K should be administered intravenously in sufficient amounts. The oral administration of binuth is to be condemned because the drug has no local hemostatic effect and may provoke vomiting

No food whatsoever should be given during the acute hemorthage but after the bleeding has stopped spontaneously or under the influence of treatment, liquids and later on the white of an egg gelatin and chopped meat may be offered.

An internist should treat the patient with acute gastric hemorrhage until the etiology of the condition has been established. The cause of hemorrhage is the determining factor in the choice of definite

treatment.

The roentgenological studies of the gastric arteries convinced the author that an efficient hemostasis requires extirpation of the source of the hemorrhage JORPH K. NARAT M D

Dragatedt L. R.: Vagotomy for Gastroduodenal Ulcer Ann Surg 1945 122 973

In this communication the author reports the present status of section of both vagus nerves in the treatment of peptic ulcer The operation was under taken because of the conjecture arrived at by ex perimental work on the lower animals that pure gastric fuice as secreted by the fundus of the stom ach has the capacity to destroy and digest various living tissues including the wall of the jejunum, duodenum and even the atomach itself. The chief secretory abnormality in ulcer patients lies not in the production of a juice with higher than normal acidity nor even in the production of more normal juice in response to the usual stimuli, although there is some evidence that this occurs but rather in the secretion of abnormally large amounts of gastric juice in the intervals between meals particularly at night when the stomach is empty and there is no obvious stimulant

Through animal experimentation it was found that section of the vagus nerves to the atomach reduced the secretion of gastne fluce in dogs to one half or even one fourth of the normal level. The data obtained so far suggest that the hypersecretion of gastne juice in ulcer patients is neurogenic in origin and that, consequently a comparatively greater reduction should follow vagus section in man than in lower animals:

In all the author and his associates have operated upon 30 patients with peptic ulcer by sectioning the vagus nerves. The transthoracic approach by resection of the seventh or eighth rib is preferred to the abdominal approach although the latter has been used in 7 cases.

Postoperatively, the author employed the Insulintest to determine if all the vagus secretory fibers to the stomach were interrupted. The rationale of the test lies in the fact that hypogly cerna induced by an adequate dose of insulin stimulates the vagus secretor, fibers to the stomach probably by an effect on the central nervous system. No effect whatever occurs if the vagus section has been complete

Of the 30 patients subjected to the operation at the time of this report, I died. This patient de veloped postoperative bronchopneumonia. Thirty of the patients in this series had duodenal ulcers s had gastric ulcers and 7 had gastrojejunal ulcers. Eight of those with duodenal ulcer were subjected to gastroenterostomy in addition to the vagus section because of high grade pyloric stenosis. In most of the cases of this type the vagus section was done by the abdominal approach at the same time as the gastroenterostomy Only 1 of the patients with duodenal ulcer failed to obtain striking and persistent relled from his symptoms and in this case there were many features suggesting a neurous. The first group of patients have been followed up for 21/2 years and, so far have remained well on unrestricted diets and without medication. For the remainder of the pa tients a longer period of observation is required be fore conclusions can be drawn, especially in the cases of gastrojejunal ulcer

The operation has no effect on the secretory re sponse of the stomach to histamine or enfeiche but abolushes the stomalsting effect of insulin hypogly cemia and a sham meal. Vegotomy reduced gastric secretion in the empty stomach at night from 50 to 60 per cent. It also resulted in the reduction of hypertomotity but the tonus and motility of the stomach were not abolished. An interesting observation was the fact that patients who complained of consultyation before the operation were relieved of this disturbance. Further study of this effect is necessary. Haron Lernars M.D.

Riera M., and Diaz, F. Low or Infrabulbar Duodenal Stenosia (Estenosis duodenales bajas infrabulbares). Rev. med. Chila. 945, 73, 855.

In the majority of cases of duodenal stemous the narrowing is located in the bulb and caused by a peptic ulcer Reentgenograms show a pyloric stenous with a secondary dilatation of the stomach. Stemous in the lower segments of the duodenum is rare and may be due to vanous factors. As a rule, roentgenological studies allow a correct diagnosis and often throw light on the nature of the lesion.

An infrabulbar duodenal atenosis may be con genital or acquired and of intrinsic or extrinsic origin. A congenital atenosis is usually caused by a malformation. Complete duodenal atresia is in compatible with life. A ring of atrophic pancreatic tissue may cause a compression of the duodenum in such case a concentric stenosis of the second portion of the duodenum with smooth borders is seen in the roentgenograms. A diverticulum may produce a duodenal atenosis, especially when it is nilled with food. In this respect the condition may be compared with stenosis of the esophagus caused by a datended Zenker a diverticulum

A spastic condition must be taken into considers tion in an acquired duodenal stenosis. Such spasms may be caused by a stone impacted in the common duct. Roentgenograms are essential for the diagnosis in such cases. Tumors of the duodenal wall or an extrabulbar peptic ulcer may produce a stenoria of the duodenum. A cancer of the duodenum responsible for a stenosis has been reported. In the majority of cases an infrabulbar stenoris is due to an extrasic lesion. The second portion of the duodenum may be compressed by the middle collc artery if ptosh of the right portion of the colon changes the normal postion of the blood vessel. The root of the mesentery may compress the duodenum in patients with an intestinal ptosis or a short mesentery. In such cases the duodenum is compressed between the spinsl column and the mesentery. There is also an acute type of arteriomesenteric steposis the mechanism of which is still under discussion.

An extrinsic infrabulbar stemoss may be caused by a tumor in one of the adjoining organ, either by compression or infiltration of the doodnal val. Tumors of the gull bladder panners, server or the left kidney may cause a compression of the doodnal may be a compression of the doodnal may be a compression of the doodnal may be a compression of the doodnal with the compression of the doodnal with the compression of the woder of the compression of the woder of the compression of the comp

the organ, with compression of the deedeman. Hesenetric lymph glands enlarged on account of Hodgkin's disease, leucemia, or lymphosarcona may produce infrabulbar compression of the deademan. An aneutym of the aorts may also be responsible for such a compression. Pertinodenal adhesion, percobolecytitis, plastic postoperative peritodies, or congenital bands may cause a compression of the infrabulbar portion of the deadenum.

Roentgenographic studies reveal a dilatation of the duodenum above the stenosis and an abnormally long retention of the ingested barium. A vigorous palpation of the involved region may provoke antiperistaltic waves and in the presence of pyloric insufficiency a reflux into the stomach may be observed. An obliteration of the mucosal folds is typical for the distention above the stenoms. If the stenosis is not complete, irregular contours of the duodenum may be noticed in the roentgenograms. Introduction of an opeque substance through a duodenal sound may prove useful. Pendulous movements of the normal duodenum may be cofusing and therefore repeated examinations are desirable. A supernumerary duodenal loop in the second portion of the duodenum may also create confusing images.

The authors report 11 cases of infrabulhar deoder all stenosis, 5 in men and 6 in women. In 9 it was possible to establish a definite etiology while in 3 the cause remained doubtful. The ages of the mile patients ranged from 21 to 42 years and of the female from 40 to 78 years. Johnson X. Narat, M.D.

Houot, A., Fire Cases of Cholecystodnodenostomy (A propos de Cinq cas de cholécystodnodénostomis) Union med. Canada, 945, 75 24

As a rule, cholecystogastrostomy is preferred to cholecystoduodenostomy although it is a less physiological method. If technical difficulties are encountered occasionally a cholecystolelunostomy is per formed although it is the least satisfactory method

In the course of 10 years the author performed 3 cholecystoduodenostomies and only 2 cholecystogas-tostomies. Usually these operations are done on account of bile fistulas with great loss of bile or on account of retention incterus. The last mentioned indication was present in 4 patients in the author's material. All of them had a cancer with numerous metastases in close vicinity to the primary tumor and at distant places. In 2 patients jaundice was due to carcinoma of \(\frac{1}{2}\) atterns papilla in 1 patient it was due to a cancer of the pancreas and in a fourth it was due to a malignant tumor of the common duct

In 4 cases the anastomosis was employed as a palliative measure to limit bile drainage to suppress jaundice and to create in the patients the impression that they were cured. The patients survived the operation 14 months 3 months, and 134 months, respectively while the fourth patient succumbed to a bronchopneumonia on the eighth postoperative day

As a rule patients undergoing cholecystoduodienostomy are undermourished and icteric and suffer from pruritus which interferes with their sleep Small and frequent meals of easily digestil le food are prescribed. The preparation of the patient for the operation should not exceed from 8 to 20 days and therefore oral feedings are supplemented by the solution 500 c.c. in 24 hours, with the addition of from 10 to 30 units of insulin. The fact should be remembered that such individuals easily develop a hypoglycenic crisis.

In view of the fact that the majority of patients requiring this type of an operation are exchectle and have hypotension a daily injection of from 4 to 6 cc. of adrenal cortex extract divided in two doese, is given. The author avoids ephedrine on account of the resulting insomnia. However in the course of the operation an injection of 2 cc. of ephedrine with 5 cc. of adrenal cortex extract is given. From 6 to 10 cc. of this extract are administered daily for the first 3 days following the operation and lessor amounts are given thereafter until the patient is able to get out of bed

A hypnotic is given to provide sleep. As a rule the hypnotic is combined with to drops of a mixture of equal amounts of tincture of belladonna and tincture of cratacquis to intensity the action of the

barbiturates.

To diminush the hemorrhagic tendency of icteric patients, from 10 to 20 c.c. of a 10 per cent calcium chloride solution are given intravenously every day

for 4 days preceding the operation.

No food is given by mouth the first 48 hours following the operation and during that time 1 000 cc. of normal saline solution, from 30 to 40 cc. of a to per cent saline solution, and from 1 000 to 1 500 cc. of glucose solution with so to 40 units of insulin are given when necessary

Except in 1 case, the author employed local anesthesis combined with a basal anesthetic The

aneathetic given per rectum consisted of chloral, (a gm) potassium bromide (a gm.) 1 yolk of an egg and mlk q.s. ad. 200 c.c. for local aneathesis. The author used from 60 to 80 c.c. of a 1 per cent solution of novocaine without the addition of adrenalm be cause the latter produces a temporary hemostasis collowed toward the end of the intervention by a reflex vasodilistation and oozing. After the peritoneal cavity has been opened a mesocyzitoeduodenocolic aneathesis is obtained with a 0 5 per cent novocaine solution.

After the bile has been aspirated from the gall bladder the organ is united with the second portion of the duodenum Sometimes it is necessary to seps rate the gall bladder from the lower aspect of the lover Catgut No oo is used for the anastomosis. The rent is about 2 cm long. The incision in the duodenum is made in the vertical direction. The second row of sutures is made with linen or chromic catgut No. oo. Sometimes omenium is attached to the suture lime. Two drains are inserted one into the suture lime. Two drains are inserted one into the subhepatic region and the other at the site of the anastomosis. The drains are left in place from 2 to 48 hours.

JOHEP K. NARA M.D.

Spatolizano B : Atypical Initial Reticuloendothe iloma of the Jejunum Associated with Chronic Stenosing Jejunitis (Reticoloendoteiloma atipico iniziale del digimo associato a diginalte cronica stenosante) Gier ital. chir 1945 1 35

The author describes the combination of a chronic, nonspecific inflammatory process with a tumor formation of reticuloendothellomatous character in a 45 year old woman who was admitted with compaints of pain in the epigastrum of 1 year's duration. She womited on rare occasions Diarrhea alternated with constipation A considerable degree of malnutrition was present Roentgenographic studies disclosed duodenographs tenosis.

An operation was performed under a combined basal and local anesthesia. A deformity of jeunum 7 cm long was found 3 cm from Treitz ligament. In the involved region the intestinal wall was thickened and indurated and the corresponding mesentery was inditated and contained numerous small lymph nodes. There was a sharp line of demarcation between the affected portion and the adjoining healthy tissue. The lesion was resected and an end to-end anastomosis was performed. The patient recovered.

Reticuloendothelioms is characterized by (1) a mesenchymal supert and the capacity of producing reticular fibrillae (2) phagocytic activity (3) syncy tial structure, and (4) the tendency to develop thefuly in endothelial direction. The following varieties may be distinguished (1) tumors with a mesenchymal aspect, (3) tumors with a reticular aspect (3) tumors with a pulposplenic sapect (4) giant cell tumors, and (5) tumors with an endothelial aspect.

The inflammatory process in the author's case resembled regional lights. The author believes that

the tumor developed following the inflammatory process.

JOSEPH K. NARAT M D

Tan, C. C., and Liu X 1 Amebic Colliss with Special Reference to Perforation. A Study of 20 Autopaled Cases. Chin M J 1945 6 366.

During a period of 10 years the clinical diagnosis of amebic colitis was made in 349 patients in the hospital of the Pelping Union Medical College, In o of 20 cases in which autopsy was performed, per forations were found. Eleven of 20 patients gave no history of dysentery of those with perforation all except I were admitted with symptoms and signs of acute amebic dysentery which had been present from 1 week to 4 months. Of the entire series of cases more than half showed varying degrees of diffuse ulceration usually in the sigmoid colon and the cecum. The cecum presented the most severe lessons and the largest number of perforations. The ileum was involved in 7 of 20 and the appendix in 5 of 15 cases examined. The cecum was periorated in 5 instances, the descending colon in 4, the sigmoid in and the transverse colon in a instance. In a instances multiple perforations were found,

The author point out has where such.

The suthor point out has whereas the diagnosis of the could be used by sure that of perforation may be the could be used by the such perforation that of the could be used by the such perforation of the could be used by the such of armost could be used by the such of armost could be used by the such could be used to t

WALTER H. NADLER, M.D.

Pfeiffer D B. and Patterson F M S.: Congenital or Hereditary Polyposis of the Colon. 1 s. Surg 945 2 666.

In every individual who is found to have rectal polyps a complete study of the intestinal tract is necessary. This includes prototocopic examinations, barium enema studies (postevacuation films and double contrast studies), and, finally reentgenograms of the stomach and small intestine.

The family history of every individual with multiple polyposis of the colon should be thoroughly investigated since this condition is often on an hereditary basis. Early diagnosis and treatment is very important for intestinal polypis tend to become malignant.

A satisfactory plan of treatment includes fulguration of the polypa in the ansi rectum and sigmoid followed later by fleorectosigmoidostomy and finally, by colectomy. The outbook for these patients is good if treatment is begun early.

Five cases of multiple polyposis of the colon are reported 4 of which had a definitely hereditary aspect. The classification, etiology pathology symptoms, diagnosis and treatment of congenital

multiple polyposis are discussed and special emphasis is placed on the tendency of the polyps to undergo malignant changes.

JOHN E. KIREPATRICE, M.D.

Weinberger H A.: Observations on Large Bowel Perforations. Surgery 1945 18 547

In the Lenox Hill Hospital, New York, 19 cases of large bowel perforation were recorded among 1,100 and autopsies during the last 10 years. Ten of the 19 cases were attributable to a perioration complicating diverticulitis, 7 were due to malignancy and 8 were due to perforation by mechanical agents within the lumen. Four recent cases in which autopsies revailed perforations of the large bowel are reported in detail.

Attention is called to the high morbidity and high mortality in diverticulitis complicated by per foration. The prognosis is also grave in large bored malignances that are complicated by perforation, with may cause the first serious symptoms in from to to per cent of these cases.

Two unusual cases of perforation of the agmost due to an intraluminal insult are recorded one was due to impaction of a fowl bone and the other was caused by rupture after a vigorously administered

Treatment of perforation from any cause is essentially the same. The surgical measures stressed are early and generous draunage with a minimum of manipulation of the site of penetration and a proximal decompressive colostomy

WALTER H. \ADLES M.D.

Meyer K. A., and Kozoll D D.: Preparation for Surgery of Patients with Colon Lesions. Q Bull Verticest. Univ M School 1945, 9 249

By virtue of a carefully planned preoperative operative and postoperative regimen, it has been possible to resect the colon if unobstructed, perform a primary "open anastomosis return the colon to the peritoneum without performing a producal colostomy and close the wound without drainage with only one death among the first 26 nationts with lesions of the left half of the colon who were treated in this manner. This was possible only because of the many physiological aids with which the authors were able to surround their surgical patients. Th advantages of this procedure over previous ones in which a colostomy (either proximal to or at the site of resection) was required are (1) a more radical resection is possible because no bowel has to be spared for use as a proximal or distal loop of the colostomy (2) such complications of exteriorization operations as wound infection herniation prolapse fecal fatula, obstruction, and stricture formation are obviated (3) a temporary colostomy and the morbidity associated with its closure is avoided and (4) primary resection and anastomosis without proximal colortomy is a one stage operation with a shortened period of hospitalization and no return visits for subsequent operations

The authors describe their preoperative manage ment with special reference to diet parenteral ammo acids plasma infusions blood transfusions auccinylsulfathiazole vitamins enemas Levine tube suction complicating diseases and preanesthetic medication

The importance of an adequate dict in patients with malignant lesions of the colon is best illustrated by the incidence of hypoprotenemia in this disease the authors have reported an incidence of 30 per cent, compared to the average incidence of 23 per

cent in a large group of surgical lesions

The value of amino acid digests for parenteral protein nutrition in human beings both to supple ment that which can be given by mouth and to supplant oral feedings when the latter is unfeasible has been demonstrated. The availability of amino acids for intravenous use is an important adjuvant to surgery and can often be ideawing.

The use of plasma as a source of protein nutrition has long been recommended but subsequent experiences have indicated that it too has short-comings

If one remembers the constituents of blood one should not be surprised that whole citrated blood transfusions have proved the most important and in the preparation of patients for operation. The authors believe there is a striking effect produced by whole blood with amino acids and they combine these two fluids in clinical practice on the theory that amino acids will be utilized for tissue protein metabolism whereas the whole blood will be more effective upon the circulating proteins.

Succiny Invitable has been the single greatest boon to colon surgery and has given considerable confidence in the undertaking of primary colon resections by an open technique rather than to rely upon crushing clamps with which so-called asptic anastomoses are carried out. With the advent of this plan of chemotherapy not a single instance of postoperative peritonitis has been seen in the authors series of cases and only a patient de

veloped a wound infection which required drainage.

The indications for vitamin therapy in the preparation of surgical patients are manifold. Most of these patients have a deficiency of one or more

vitamins.

The first enema and cathartic are given prior to the start of succinylsulfathiazole therapy. The second enema is given during the 24 hour period preceding surgery this is done to allow the drug to attain as

high a concentration as possible.

Intragastric suction should be established before operation to prevent distention. Control of distention prevents tension on the suture line and is as effective as a proximal colostom; with regard to decompression. Also the intragastric tube will aspirate swallowed inhalant anesthetic gases if used and help prevent postoperative aspiration pneumonia. Still another value in the use of this tube is in the lact that the patient can drink freely immediately after operation which minimizes the dangers of a postoperative parotitis.

Because most patients with colonic diseases are in the sixth and seventh decades, a proportionately higher incidence of diabetes hypertrophied prostatic disease hypertension and oral sepsis is present. Unless the patient is acutely obstructed all of these conditions demand correction before bowel resection is undertaken.

The authors describe their operative management with special reference to anesthesia open versus closed resections, sutures, wound repair blood transfusions Levine tube suction and vasooon

strictive drugs.

Whenever possible they have employed nuper came spinal anesthesia which provided an adequate period of anesthesia without the use of inlying intraspinal needles.

Any attempt at following a so-called asoptic tech inque in anastomoris has been avoided deliberately, for it is believed that the use of clamps in closed resection is not without the danger of necrosis of the bowel edges and is cumbersome.

The authors employed the principle of fine inter rupted sutures on atraumatic needles in the anasto-

mosis and the wound as well.

Interrupted sutures are used in closing all layers of the wound

Blood transfusions are given during the operation although the patient may have received 2000 c.c. of more of blood during the preoperative period. This is the most effective means of preventing shock and compensating the patient for blood loss sustained as the result of surgery.

Suction with the Levine tube is continued during the operative period to decompress the stomach which might otherwise obscure the operative field to prevent the swallowing of inhalant gases if given, and to prevent the supiration of gastric content

through emesus.

Vasoconstrictive drugs are given to prevent the drop in blood pressure frequently seen with spinal anesthesia, the authors particular preference is

neosynephrin

Granted that the patient is operated upon most skillfully after having been prepared as carefully as outlined a successful result will not be achieved unless he is given equally paintaking postoperated care. This care includes a wide variety of therapeu tic adjuncts, many of which have been outlined in the preoperative regumen.

Attention must be paid to the physiological prin

ciples of fluid balance

Blood translusions were rarely necessary post operatively in patients who have been given 2 occ. or more of blood before and during operation However unlimited quantities of whole blood are administered to patients showing the need for it.

The rationale for the authors use of parenteral amino acids has been discussed but the need for them is frequently more acute because of starvation

which may follow colon surgery

The rationale for gastric suction has been outlined Suction should commence before the patient is sent to the operating room continued during the oper to the operating room continued during the oper ation and resumed immediately after his return to

Hyperventilation is employed routinely with mixtures of carbon dioxide and oxygen, and is ad ministered every z or a hours until the patient breathes deeply or coughs. By this means greater oxygenation of the pulmonary alveoli occurs, mucha is oxygenserion or the pulmonary asystom occurs, mucus in dislodged, and pulmonary complications are avoided oracogen and priminately compared to a real cutterer with a nasal catheter or nasel mask in patients whose condition is precar or nazzu mazz in patients whose complication.

us or who have a cartisal computation.
Vitamins are administered with the intravenous fluids in the dosages given during the preoperative period they are given orally when the patient re sumes a diet, but are usually not necessary when he

While the patient is on gastric suction, all sulfon where the patient is on gastric action, an autou amides are administered intravenously in desages and a second to maintain a level of from 8 to 13 mgm. per cent in the blood. Sodium sulfadiazine is the drug of choice and usually not more than 5 gm. per day is required.

The drinking of water is encouraged as soon as the natient returns to bed

Elevation of the foot of the bed is employed for the Energy and a che root of the pen is employed for the first 24 hours to prevent shock and encourage the drainage of mucus from the respiratory tract

Catheterization is required more frequently after spinal anesthesis and is done if the patient has not

Patients are placed in a wheel chair for 15 minutes on the first postoperative day and more frequently and for longer intervals thereafter They walk with-

The diet is not resumed until the Levine suction tube has been withdrawn.

Enemas are not administered until the fifth or sixth postoperative day and then only in small

Mason J. M., III: Surgery of the Colon in the For CHARLES BARON M.D. ward Battle Area. Surgery 945 8 534

bout one half of the diameter of the entire right colon both flexures and a portion of the rectorig mold is found to lie behind the peritoneum. In ex most a tound to me beating the permuseum an ex-plorations and for the relief of tension on colostomics, the simple procedure of mobilizing these areas should be kept in mind. The lateral attachments of these portions of the colon are avascular the mesentery coming in from the medial aspect, and they can be incised with impunity the colon being

Injuries of the right colon from the fleocecal junction listally which necessitate the removal of the cecum and any portion of the right colon are a problem because of the difficulty in dealing with the transected end of the terminal ileum. The open end of the ileum is, of course a problem because of the erosive action of its contents, if they are allowed to drain out into the abdominal wall. There are four

I A primary anastomosis may be performed be tween the terminal fleum and the cut end of the tween one terminal meum and the cut end of the transverse colon (end to side fleotransverse color transverse committees to same incorressive common tends of the colon being turned in by

ture.

An end to side primary anastomosis may be per 2 An end to sate primary anastomora may be per formed, the blind open end of the colon being brought out of the abdomen through a stab wound

3 A lateral anastomosis may be performed be 3 A meteral anastromous may be performed be tween the fleum and the colon, both ends (fleum and colon) being brought out distal to the anastonosis as a double barreled spur colostomy

4 The Beum and colon may be exteriorized as a 4 the neum and count may be extensived as a long sutured double barreled lleocolostomy conmile sustaired docume particled necrosianismy con-structed for the purpose of early crushing of the spor

tto a cuamp.

The first three procedures are objectionable since they necessitate a primary anastomosis in an unprepared colon. This is too dangerous. The fourth prepared coson. And is too dangerous. The fourth results. Early crushing of the spur at the base coming the really constitute of the spon as the one hospital within two or three weeks or earlier crossing at the front preferably the former will prevent mg at the tront presenting the southern man present consisting of the administration of vitamins the correction of dietary deficiencies and the restoration of the blood chemistry to normal levels will play a

All exteriorizations should be made through separate stab wounds and not through the upper or lower poles of an exploratory incision. Often it has been convenient to bring a colostomy out through a debrided wound of entrance or exit, but this is avoided if possible. There is a piace for tabe ce costomies in the management of single perforations of the creum. However in general, it is preferable to exteriorize such wounds The evacuation of the patient and the change of management that he h subjected to may result in periods of time during which the proper attention cannot be paid to the

I tube may be of advantage in diverting the atream of iteal contents in an ileocolostomy or it may be used in a colostomy but its period of usefulness is not very long as leakage soon occurs around

Questionably viable areas of colon due to a damaged mesentery or to trauma to the wall of the gut proper should be exteriorized

The management of war wounds of the color differs materially from the management of kniom of the colon generally encountered in civilian practice. The excellent results obtained in civilian practice by the performance of primary anastomosis on the properly prepared colon permits the immediate re placement of the anastomosed portion in the general peritoneal cavity. In dealing with emer gency war surgery it is believed that all colon in juries should be exteriorized and that no primary anastomosis is warranted.

Pierpont R. Z. Peterson F R and Dulin J W :
Operative Results of Surgery of the Colon for
Seoplastic Disease Surgery 1045 18 441

The operative results of colon surgery for neoplastic disease covering the period between January 1 1917 and December 31 1914 in the State University of Iowa Hospitals Jora City are reviewed and the results of treatment tabulated. Exploration was carried out in 221 patients and of these 171 had resection of the colon. a resectability rate of 52 percent.

Among the 224 patients operated upon there were 46 deaths a mortality of 20 per cent. Among 117 resections 23 deaths occurred a mortality rate of 106 per cent. Among 81 patients in whom a pal lature operation was done for the relief of obstruction there were 17 deaths a mortality rate of 100 per cent. Altogether there were encountered 124 lesions of the 12th side and 82 lesions of the 12th side and

The authors report that an increasing number of tesections with limmediate end to end anastomous are being performed in their clinic and point out that there is no one operative procedure which can be applied to all neoplasms of the colon.

WALTER H NEETE MD

Miles, W. E., Gordon Watson, C. Milligan, E. T. C. and Corbett, R. S. i. A Discussion on the Man agement of the Permanent Colostomy. Proc. A Soc. M. Lond., 1945, 35, 691.

Miles observed that very few doctors appreciate the value of the daily wash-out of the colon for con trolling bowel movements. There is no doubt what ever that bowel action can definitely be controlled by means of a daily wash-out with 114 pints of plain water at a temperature not exceeding 80 F as de termined by the thermometer. This is repeated if necessary Should the temperature exceed 80 F mertia of the muscular coat of the colon is produced which results in retention of part of the fluid used and several hours may elapse before the muscular inertia disappears. A plain wash out if properly administered can be relied upon to clear the colon completely of its fecal contents It sometimes happens that difficulty is experienced in introducing the tube into the colon to the required extent rule this is due to the attempt to introduce the tube when the patient is sitting up or standing or when he rauses his head in order to pass the tube under guidance of the eyes and puts his abdominal muscles on the stretch. In order to pass the tube the pa tient should be recumbent with the abdominal muscles completely relaxed One of the causes of difficulty in passing the tube is acute angulation of the colon at the point where it changes direction and passes forward to the opening in the anterior abdominal wall. Such angulation can be entirely prevented by mobilization of the terminal portion of the descending colon

A weak spot in the abdominal wall has been created by the passage through it of the loop of pelvic colon destined for the formation of the colos tomy In order to afford support to the weakened abdominal wall a well fitting coloatomy belt must be obtained. On no account should the patient allow himself to be persuaded to have a rubber bag at tached to the cup of the belt to act as a receptacle for feces. Such a bag creates suction and in the course of time the part of the colon which is proximal to the stoma. Is turned inside out and extruded through the stoma. It is important that the belt should be worn continuously when the patient is up and about.

The stome of a colosiomy should be prevented from becoming stenosed by systematic dilatation. For this purpose the patient must be taught to pass his index finger to its full extent through the stome as the coloriony wound has healed firmly the index finger to its full extent before flexing the distribution. As soon as the coloriony wound has healed firmly the index finger of the left hand (if the stome is on the left side) should be passed through the stome every day for a month then once a fortnight for two months and finally once a month for six months, when it will be found that the tendence to contract has ceased

(tokbox !! ATROX states that in order to secure a good working colostoms it must be well fashloned and first of all it is essential to secure a good snor by keening the bowel outside of the abdominal wall for at least three weeks by the use of a glass rod or other means it is also necessary to avoid undue tension on the mesentery. The stoma should be well clear of the anterior superior spine to avoid interference with the belt. The size of the opening in the abdominal wall should be just large enough to allow a inger to pass down on either side of the glass rod An ellipse of skin should be removed to prevent subsequent contraction which is apt to cause recession of the opening. All cups and bags should be avoided a plain celluloid disc is all that is needed nationts find this unnecessary and wear only a singlet

The colostomy is trained to act only when it is washed out, which is done at the same time each day with plain tepid water without soap and a flexible tube (size 14) which is passed up as far as possible with great care. The fluid is run in slowly preferably by Junnel.

When this is carefully carried out at the same inner each day the colon learns to respond in an automatic way and many victums carry on their work with little deability. In a small percentage of cases the colon will behave as if the stoma was the rectum and act regularly and automatically without a wash-out with or without a mild apperient. If there is a tendency to looseness disasters may occur

GABRIEL stated that after a colostomy (terminal loop left Illac, or transverse) has been established, we have to decide if the bowel is to be allowed to act naturally or whether the wash-out regime is to be adopted. He is opposed to the wash-out regime for colostomics for the following reasons

It is unnecessary because the great majority of colostomy patients have good intestinal function and with reasonable care and discretion in diet they achieve a satisfactory and regular rhythm with

formed colostomy actions

3 It is harmful because it is not natural for the colon to have a solution thrust fint of daily be it plain water normal saline solution or soan aware. Colonic lavage for prolonged periods induces a chronic entarth of the colon with a hyperenic nuccosa a contracted bowle lumen, and the excessive formation of mucus in other word this routine induces a state of catarrh and irritability in the colon which is exactly contrary to what is dear asked after a consensure.

3. It is dangerous because the passage of a tube up the colostomy may lead to perforation perionitis, and death. In hospital work a colostomy wash-out a rarely necessary in the immediate postoperative period and usually the insertion of a glycerine supperiod and usually the missrition of a glycerine sup-

pository serves the purpose equally well.

MILLIOAN says that there is no surgical substitute
for the rectum. The rectum is under the control of
the patient for storage and ejection. A coloatomy
can never be trained to have conscious sensations or
voluntary powers similar to the rectum. The crude
muscles of the abdominal wall cannot act like the
specialized rectal and anal muscles in retention and
expulsion.

The same rhythm or regularity of bowel action can be attained with a colostomy as with a normal rectum that is, the s4 hour rhythm for in all of us with or without a rectum this thind depends upon

the colon

This author states, We cannot control the colostomy but it can be controlled." He also maintains that Nature standard of one and only one motion a day can be reached with a colostomy. How then are we to attain but one bowel action a day for a colostomy?

The answer is by routine morning wash-out if the rhythm does not come naturally after a short trial. A bowel completely emptied by a wash-out followed by a morning bath and clean dressings enables a man to face the day and his fellows without handeau.

The bowel action is likely to be regular after the removal of the rectum if the daily evacuation before colostomy was by rhythm rather than by feeling.

CORBETT considers the subject under two headings (1) the part played by the patient and (2) the

part played by the surgeon.

The patient wants a regular evacuation of the bowel and freedom from the anxiety of leakage. He wishes to be able to carry on his daily life in much the same way as he was accustomed to do before operation. His part in the management can be carried out in one of two ways.

1 Training the bowel to act regularly of its own accord in order to have a daily action.

2 Washing out the bowel regularly every day. In the part played by the surgeon it is of greek importance that certain essentials should be remembered in the formation of the coloromy and in the management of the postoperative period. This will lead to easy management and avoid complex-

I There is a choice of three positions for the stoma at the left flium, at the rectus sheath and possibly at the epigastrium. Colortomies in all of these positions appear to work countly sell

2 The formation of an adequate sput is essential. A glass rod is popular easy to apply and very satisfactory. The rod or a substituted rubber tabe abould remain in position for a or a week.

for 3 or 4 weeks.

Butts, J. B., and Conley J. E.: Perinephric Abscess; Report of 3 Cases Simulating Acute Appendicitis. U. S. Aus. M. Bull. 1945 45 1051

In the differential diagnosis of any abdomal pain, one should coasider perinaphric abscers, although it is uncommon. The syndrome of obscure fever with pain in the right fants and should be to perinaphric abscers may be easily confused with accure appendicitist and lead to a deleterious appendectiony. The authors report y case simulating acute appendicits the confusion of the common processing the production of the property of the subscriptions of the production of the produc

A peringephre abscess is an infection outside of the kidney capsule with resultant necrosis of the perinal connective tissue and appuration in the real fossa. The cases presented were simple perinephre abscesses as contrasted to complicated abscesses as sociated with pathological kidney changes, Authorities differ in opinion as to whether all perinephric abscesses are secondary to some infection in the kidney.

Abdominal exploration may be undertaken when the clinical pacture of periophne absens simulate acute appendicatis, and when urinary abnormalities are absent as they were in these 3 case. Often there is a history of a sidn infection or a severe oper respuratory infection several days or even weeks be fore the onset of the first symptoms. In these 3 cases no such history was effected, although in case a severe back injury occurred prior to the onset of the symptoms.

the symptoms. Anorexia, fatigability and night sweats are early complaints, followed usually by chilis and ferring he fain in the right faink radiating to the costovertebral angle and to either of the upper or lover quadrants range be the earliest specific complaint. The 3 patients in this report all had pain in the right faink radiating to the right lower part of the abdomina Simeone reported that lesions involving the perinephrium anteriorly cause pain in the right lower abdominal quadrant. At theson reported that 1 of 117 patients with perinephric abscess presented with complaints of lower abdominal pain, and 8 of the 70 had associated abdominal rightly. Urinary symptoms are uncommon in case of simple perinephric sense of simple perinephric

abscess.

On physical examination the patients are acutely ill and may show evidence of weight loss if the discusse is prolonged. Most of them have tenderness in the right flank, and spasm and awelling are often present also. Sincone reported 2 of 34 cases with

tenderness present in the right lower quadrant only Scoliess with the concavity toward the affected aid due to paravertebral muscle spasm is a prominent sign of perinciphric abscess Secondary inflamma tory involvement of the process muscle may cause the patient to hold the hip flexed. Motion of the hip then causes severe pain

Positive x my signs such as obliteration of the posas shadow, enlargement of the kidney shadow concavity of the spine toward the side of the lesion decreased movement of the kidney and disphragm on respiration and displacement or distortion of the kidney or ureters may help to make the diagnosis Only 45 per cent of the cases show positive x may signs, so too much emphasis should not be placed on

negative findings.

In simple perinephric abscess the urne is normal unless there is some kidney abnormality. The presence of albumin and white blood cells in the urine indicates gross involvement of the kidney itself. The staphylococcus aureus is most commonly cultured from simple perinephric abscesses while in complicated perinephric abscesses while in complicated perinephric abscesses condary to renal calculus and infection the escherichia coli is found. Chemotherapy before operation may be responsible for negative cultures in some cases.

Prompt surgical drainage is the treatment of choice and leads to dramatic improvement in the symptoms. If the perinephric abscess is complicated a primary or secondary nephrectomy may be necessary. Usually the disease is far advanced when the disgnosis is made, 12 and 8 days respectively, intervened between the admission of the patient and operation in the reported cases.

There was no mortality in the reported cases of

sumple perinephric abscess while mortalities of from 14 to 50 per cent were encountered in cases of complicated perinephric abscess

ROBERT R. BIGGLOW M D

### LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Nigam, K. S., and Sircar J K.; An Additional Test Helping in the Diagnosis of Chronic Cholecystitis. Ind J Su g 1945 7 95

Patients with chronic cholecystitis show marked cholestero retention. The authors estimated the cholesterol in separated serum for which they used the colormetric method. In most of the cases the estimation was done on an empty stomach in order to eliminate the dietetic factor. The estimation was carried out on 86 cases.

The minimum figure was 73 mgm in a child aged to years and the maximum was 350 mgm. in an old man of 60 suffering from an enlarged prostate with secondary vestcal calculus therefore the average was 1450 mgm. The table shows the amounts of serum cholesterol within certain limits in the case In this sense of cases the reading is indper than that found in the whole blood in India by other worker but it approaches the readings in other countries

Serera Cholesterol	Note	ere Per	centag
Below 100 mgm	4		4 7
Between 100 and 119 mgm	13		7 4
Between 120 and 130 mgm	15	2	o i
Between 160 and 170 mgm	11	1	28
Between 180 and 100 mgm	10	1	16
Between 200 and 220 mgm	5		< 8
Above soo mgm	1		

The ingestion of food rich in cholesterol for some time has been known to produce an increase in the blood cholesterol. It has been the aim in the present work to study the changes in the amount of cholesterol in the blood of human beings after a single ingestion of fatty diet and to compare them with the changes so obtained in patients with cholecystitis At the very outset it may appear that the test of giving fatty diet may not be safe in cases of chole cystitis but fortunately in this series of cases no complications or trouble occurred. The diet which has been prescribed does not contain such an excess of fat that it upsets the patient, but it has enough cholesterol in it to make the estimation desirable The test need not be done in cases of acute chole evatitis in which the diagnosis is obvious certainly very helpful in the obscure and chronic cases. In scute cases the test should be applied after the acute symptoms have subsided and the patient is allowed solid diet

It was found that II of I2 cases showed the maxi mum rise in the cholesterol level was below 80 mgm only in I case the figure was high. The average was about <2 mgm. Seven cases of gall bladder disease could be studied and of these 6 were cases of chronic cholecystitis and I was a case of cancer of the gall bladder as proved on the operating table. In a cases the cholesterol metabolism could be studied both before and after operation and it was noticed that the rise in the level was not so high after the operation of removal of the diseased gall bladder. If tables are compared after the diseased organ is removed from the body in cases of cholecystitis the metabolism curve again becomes low like that of other normal people. It can be judged by comparing the graphs of patients who have been operated upon. If the rise of cholesterol is between 100 and 150 mgm the case is probably one of cholecystitis, but if the rise is more than 150 mgm one should be inclined to think it is a case of cholecystitis and this adds to the existing methods of confirming the diagnosis of chanic chalecystitus

By comparing the tables one is forced to think that the marked rise in the level of the serum cholesterol in the table shown herewith is certainly due to the diseased condition of the gall bladder. In all of the first 6 cases the rise was more than 100 mgm the minimum being 100 mgm. the maximum 188 mgm and the average 1615 mgm. The seventh case was that of a cancer of the gall bladder and in this the rise was only 75 mgm, although the fasting serum cholesterol was 300 mgm, and was due to jaundice. It is only in the chronic inflammatory conditions of the gall bladder that a marked rise in the level of

serum cholesterol occurs in the case of a new growth this was not noticed. CHARLES BARON M.D.

Ottoman R. E., and Baker J : Metastatic Staphy lococcal Infection of the Gall Bladder West J Surg 1945 53 361

The authors report 2 cases of empyems of the gall bladder as a complication of simple superficial staphylococcus infections. One was secondary to a felon of the thumb and the other followed a anc cession of bolls. Staphylococci were cultured from the gall bladder in each case. One gall bladder con tained stones but no stones were found in the other

In each patient the diagnosis was difficult because of red cells, pus cells and staphylococci in the urine. In a patient a severe pyelonephritis intervened be tween the bolls and the cholecystitis in the other a perirenal infection was suspected but it was not

Cholecystostomy was done in each case and re sulted in recovery EARL O LATRICE, M.D.

Mirizzi P L 1 The Cystic Duct in Biliary Lithiasis (Cl conducto cistico en la litinais biliar) Prense ered. argeni 1945, 38 2149

The author describes the normal anatomy and histology of the cystic duct and variations of the position of the duct under pathological conditions.

Mucostants of the cystic duct may be caused by an abnormally high registance of the sphincter of Oddi. increased mucous secretions of the extrahepatic ducts, dilatation and hypertrophy of the wall of the cytic duct.

The cystic duct may be entirely absent and in such cases the gall bladder empties itself directly into the common duct. The cystic duct may also form a junction with one of the hepatic ducts, usually the right. A double cystic duct has also been described The cystic duct may be adherent to Hartmann's pouch. Cases of primary cardnoms of the cystic duct have been reported in the literature.

A dilatation of the distal portion of the cyatic duct comparable with a river estuary may be the se quel of stenosing inflammation or functional disorders of the sphincter Such formation is of practical imnortance because a ligation of the cystic duct may produce traction on the opposite wall of the common duct and lead to an interruption of the biliary flow

Under normal circumstances the cystic duct forms an acute angle with the hepatic duct. As a result of a gallstone formation this angle may become more pronounced and interfere with the bile flow to the gall bladder Paroxysmal crises accompanying the resulting anatomofunctional hepatic syndrome may become quite serious and may produce jaundice. Scierosis of the biliary ducts in such cases distorts the normal anatomy and there is great danger of madvertent ligation of the right branch of the benetic artery

Clinical diagnosis of primary carcinoma of the cystic duct is impossible. As a rule the condition is

mistaken for cholelithiasis.

Biliary fistula of the cystic duct after an operation is usually due to a stone formation between Heister's valves. Occasionally a biliary phlegmon of the abdominal wall, without a stone formation, may bed to the formation of a fistule of the cystic duct

Lithiasis of the cystic duct is a rare condition Icterus is observed in about one-third of all the cause An inflammation of the stump of the cystic duct

following cholecystectomy without a stone formstion is relatively frequently responsible for post operative pains.

Neuromas in the wall of the cystic stump may be responsible for postoperative pains. A dilatation of the stump of the cystic duct may be followed by a concomitant dystonia of the sphincter of Oddi. Some times such conditions require a choledochodrode postomy

In selected cases abnormalities of the lumen of the common duct may be corrected by the implantation of the cystic duct into the duodenum in order to side track the bile flow. The operation may be considered in some cases of inciplent stenosing pancrestnis.

The author advocates preservation of the cystic duct after cholecystectomy not only to facilitate operative cholangiography but also to create a safety valve in cases in which an incomplete obstruction of the distal third of the common duct is present

JOSEPH K NARAT M.D.

Dameshek, W., and Miller E. B.: The Megakaryocytes in Idiopathic Thrombocytopenic Pur pura, a Form of Hypersplenism. Bied J Hemel 046

The megakaryocytes of the sternal bone marrow were studied at bloosy in 11 cases of idiopathic thrombocytopenic purpurs and compared with those of 10 normal individuals, of 5 cases of thrombocytopenic purpura associated with various types of splenomegaly and of a large group of miscellaneous bematological conditions associated with a reduction in platelets including leucemia.

Megakaryocyte counts expressed in terms of a million nucleated red cells and differential counts of megakaryocytes were made. The megakaryocytes were classified as megakaryoblasts, promerakaryocytes and mature forms, and were further subdivided into those showing granularity platelet production degenerated forms, and mitoses.

In the normal individuals, not more than 300 megakaryocytes per million nucleated red cells were present, and an average of 68.6 per cent showed platelet production. In the case of acute idiopathic thrombocytopenic purpura although the platelets in the circulating blood were rare, the megakaryocytes were increased being present in a proportion of from \$66 to 743 per million nucleated red cells However platelet production was greatly diminished and found in from only 8 to 19 per cent of all mega karyocytes. Following splenectomy, there was a striking increase in the platelet production, which was now present in from 69 to 85 per cent of all the cells, and the large masses of new platelets in the

marrow were often very striking. In the cases of chronic idiopathic thrombocytopenic purpura the megakaryocytes were considerably increased over the normal values but showed great diminution in platelet production following spienectomy extreme degrees of platelet production from the megakaryocytes took place. In splenomegaly of nonleucemic origin (carrhoels, spienic vein thrombosis, Gaucher's disease, Felty's syndrome) the megakaryocytes were somewhat increased but platelet production was normal. In aplastic anemia, lymphosarcoma acute leucemia and other diseases invading or destroying the bone marrow, the megakaryocytes were conspicuously reduced the few remaining cells being of normal morbiology.

The findings of increased megakary ocytes and greatly diminished platelet production in the marrow before splenectomy and the atriking increase in platelet production after splenectomy indicate a definite pathogenetic relationship of the splene to the disease. Idiopathic thrombocytopenic purpura is probably a form of hyperspleniam (splenic thrombopenia) in which, through a possible hormonal mechaniam the megakaryocytes of the bone marrow are inhibited from normal platelet production and delivery. The marrow findings in idiopathic thrombocytopenic purpura are sufficiently characteristic to be of diagnostic value in differentiating the disease from leucemia and other conditions associated with low blood platelet count Harou Lauruam MD.

#### MISCELLANEOUS

Etcheverry M: Postoperative Eventration through the Anterolateral Abdominal Wall (Le eventra clon post-operatoria en la pared antero lateral del abdomen) Rev méd quir pot fem B Air., 1945 13: 305.

The frequency of eventration remains approximately the same from year to year it occurred in about 2 5 per cent of all laparotomies according to the author's statistics. Three main factors responsible for eventration must be considered (i) organic deficiency of the patient, either local or general, (2) technical errors, and (3) postoperative complications which interfere with normal restitu

Four conditions of the abdominal wall can be distinguished in the discussion of disruption of the abdominal wound the hypertonic and hypotomic abdomen and the strong and weak abdominal wall.

tion of the tismes.

Eventration occurs mostly in the anterolateral portion of the abdomen at the site of the fusion of the superficial and deep aponeurosis.

As far as the operative technique is concerned, 3 points are essential (1) adequate exposure, per mitting essy access and manipulation of the organs to be operated on, (2) proper selection of the zone of the abdominal wall, allowing perfect reconstruction and (3) selection of the direction of the incision with regard for the integrity of the muscular fibers and nerves.

A transverse incision seems to be logical because it is parallel to the blood vessels and nerves. Particular care must be exercised when catgut is used as suppreparative.

The author mentions three frequent causes of disruption of the abdominal wall (7) a subcutaneous or subaponeurotic hematoma attributable to in sufficient hemostasis (2) lafection of the wound, and (3) the introduction of a drain into the abdominal cavity. The irritating effect of a foreign body such as a drain is intensified by contamination of the abdominal wound by infected fluids escaping from the personnel cavity.

The author prefers a double knot to a triple knot because of the facility of tying and a lesser amount of foreign body left in the wound. If a triple knot is used, catgut is usually tied twice in the same direct ton and the last time in the opposite direction. The author prefers tying the knot in alternating directions. He also maintains that a continued suture approximates the tissue better than interrupted satures.

Colp R. and Druckerman L.: Subtotal and Pallia tire Gastrectomy for Chronic Gastric Ulcer Surgery 1945 18 573

A series of 42 consecutive patients suffering with chronic gastric uleer treated surgically is presented. The duration of the disease varied from several months to 40 years. The patients were admitted to the surgical service only when the pain was becoming more severe despite adequate treatment, when an intractable pyloric stenosis was evident, when hemorrhages had become recurrent and when the presence of a carcinoma was suspected. In the series of 42 cases of benign uleer the roentgenologist reported 3 cases as being highly suggestive of neoplasm. Of 22 cases in which the gastroscopist could visualize gastric ulcerations, 5 were pronounced malignant but were subsequently proved to be benign. An absolute achierbydraw was present in 12

The preoperative preparation of such patients many of whom are in poor general condition is out lined. At present the authors prefer continuous spinal anesthesia combined with sodium pentothal intravenously since it provides the best relaxation and exposure with a minimal amount of retraction Exploration is carried out through a median epi gastric incision and the operation of choice is subtotal gastrectomy of the Holmester type. If the lesion is so massive that resection appears imposaible preliminary jejunostomy seems a logical procedure to put the stomach at partial physioiomical rest and cause regression in size of the ulcer so that partial gastrectomy may be performed several weeks later with comparative case and safety The stomach is usually removed in a retro grade manner, and antecolic anastomosis using a short proximal loop of jejunum about 6 inches long is performed.

In 9 cases in which either a very high gastric re section had been performed or in which a marked

preoperative dilatation of the stomach increased the possibility of postoperative gastric atony a complementary jejunostomy for alimentation was done There were 6 cases in which the antrum and pylorus were removed, but the ulcer was left in suls. The so-called palliative gastrectomy has not had wide application and has one major disadvantage-the lesson which is not removed may possibly be car cinomatous. On the other hand removal of the antrum and pylorus of patients suffering from gastric ulcer almost always results in anachlity so that recurrent gastric or gastrojejunal nicer is almost unknown.

The indications for palliative gastrectomy in this series were penetrating ulcer high on the lener curvature or ulcers juxtaesophages in location. The general physical condition in a patients was so poor that an excessively high resection necessary to re move the ulcer would have been extremely hazard gus

The postoperative course and complications are described. In the series of 4s consecutive gastrec tomies for gastric ulcer there were a deaths.

IORN L. LINDOURST M.D.

Poth E. J. Ross, C. A. and Fernandez, E. B : An Experimental Evaluation of Sulfagoxidine and Solfathalidine in Surgery of the Colon. Surgery 1945 18 529.

The study made by these authors shows sulfa suxidine and sulfathalidine to be valuable adjuvants in surgery on the colon of the dog. The indications are that the so-called aseptic methods of anastomosis should be used whenever possible, but it is evident that an open technique may be undertaken with a considerably increased degree of safety observations support the satisfactory results obtained when man is treated in a similar manner

The reaction, as revealed by the amount of edema of the omentum adherent to the line of suture, is significantly less when the bacterial flora is modified by the administration of the drugs. The most elearcut evidence of the value of these drum is re vesled by the results which followed the method of open anastomosis, wherein no effort was made to prevent fecal soiling of the operative field. Even though the degree of spillage was much greater following the administration of sulfasuridine because of the semifluid nature of the contents of the bowel, there was a striking difference in the operative mortality and morbidity. Forty-three per cent of the control animals died of generalized peritonitis due to disruption of the line of sature. One hundred per cent of the control animals showed gross leakage at the line of auture. These observations are in contradistinction to absence of death and lack of gross leakage through the suture line when the animals had received sulfasuxidine and sulfathalidine. Furthermore in the control experiments there was scute inflammation and little evidence of healing and repair by the fifth postoperative day Follow ing drug therapy the inflammation had subsided and

the tissues had undergone orderly repair and healing. BENJAMIN GOLDMAK, M.D.

Patton, E. P : Proctological Problems of the Pedi atrician. J Polist, S Louis, 1945 27 532

The etiology of constitution, painful defecation frequent small stools, and bleeding per rectum in infancy and childhood is often an abnormality or a disease of the anus or rectum which can be deter mined by proctologic examination.

A frequent cause of constipation in early inlancy is an incomplete dissolution of the membranes be tween the bindgut and the proctedeum. This may be manifest at birth, but may not develop to a de gree of marked obstruction for days or even weeks The opening may be adequate at first, but as time goes on, folds of mucosa of the segment of rectam above the constriction overlap across the lumen. thus forming a valve A stenosis, in the form of a disphragm or ring of thesie, can be overcome by one or more gentle dilutations with a lubricated, rubber

covered finger The usual cause of pamful defecation is an anal fissure or an area of proctitis. In an infant or small child an electric otoscope using a large speculum serves as a useful proctoscope. Anal fractices are readily visible. Proctitle is seen as a red, congested area of mucosa contrasting with the pale pink, nor mai tissue around it. A regimen to produce small soft stools is necessary to beal a fasture or proctitis. This involves the establishment of two regular toilet times daily the occasional use of a suppository or enema, the intake of generous quantities of water stewed fruits and vegetables, the temporary use of combinations of agar and mineral oil by mouth, and anesthetic cintments locally. The healing of fisaures and proctitis is aided by the topical applica

tion of silver nitrate. Frequent small but otherwise normal stools may be caused by anal fissure, proctitis, or a local der matitis The latter may be due to a fungus infection, pinworms, scabies, cryptitis or papillitis. The treatment of this complaint is dependent upon the

The many causes of bleeding per rectum are well known. The causes of rectal bleeding visible through the proctoscope are fissure, proctitis, polyp, or ulcer

(nonspecific or amebic) Prolapse of the rectum may be caused by a polyp.

but it is usually due to a redundant mucous mem brane. In the immediate treatment concern should not be so much for prompt reduction as for perms nent retention after reduction. If prolapse is allowed to persuat for hours, or even until sponts neous reduction with simple recumbency takes place, the resulting edema and local submucous reac tion is beipful in producing thickening and fibrous tissue which will belp in permanent retention if the stools can be kept small and smooth enough to pass easily while mucosal edema is subsiding Various methods are proposed for maintaining reduction, such as continued recombency elevated hips, or

strapping the buttocks together with adhesive tape. The anti-constipation regime as outlined before must be instituted concurrently. If conservative treatment fails to prevent recurrences a sclerosing solution may be injected in the submucous tissues.

Although megacolon is not primarily a proctologic problem, some cases can be relieved by systematic rectal dilatation with graduated dilators.

Perirectal abscess fistula in ano and hemorrhoids in childhood are managed as in later life

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ERNEST E ARNHEIM M D

Alecha J M Carpanelli, J B and Ferreira J A.; Amebic Abacesa of the Liver Opening into the Perlioneal Cavity (Abacesa amebiano hepatico ablerio en cavidad perlioneal) Rev. 4x méd argent 1945, 59 1043

Amelic abscess of the liver is the most frequent localization of ameliasis outside of the intestine An analysis of 14 poy cases of ameliasis showed hepatic abscess clinically in 486 per cent but autopry showed it in 36 per cent.

The diagnosis is often not made until perforation occurs although a careful study of the history should give indications of the true diagnosis. X ray examination may show malformation of the liver especially of its diaphragmatic surface and may also show peritoncal effusion. Rectosigmoidoscopy may be useful in showing dysenteric ulcers. In 90 per tent of the cases the pus in the abscess is aseptic. Amehae are much more apt to be found in tissue caretted from the walls of the abscess.

A case is described in a man of 37 years in whom the diagnosis was not made until operation although he had a rather typical history. He had been treated in a clinic 3 years before however and neither laboratory nor roentgen examination had given any indication of the true diagnosis. When he was admitted with the picture of acute peritonitis a diagnosis of perionated acute cholecystitis was made. Operation showed the true condition and the abscess was evacuated and emetin treatment begun. The amebae disappeared from the feces after the first series of emetin and the patient made an un eventful recovery.

Although the pus of the abscess was aseptic the diagnosis of its amebic character was made from the lack of any history or evidence of pyogenic infection the macroscopic appearance of the abscess and its contents the relative senousness of the case and the slight postoperative peritoneal reaction, the presence of the vegetative forms of amebae in the feesace of the vegetative forms of amebae in the researce of the vegetative means of the disease.

Some surrecoms use mentin intranspiratoneally dur

ing operation, but the authors do not believe there is any logical indication for its use in this way

AUDREY G MORGAN M.D.

Brunschwig A.: Radical Resections of Advanced Intra Abdominal Cancer Ann Surg 1945 122 923

Progress in supportive treatment of the surgical patient permits of the extension of radical surgical attack upon advanced abdominal cancer. Experiences in a series of 100 patients revealed that effective, albeit in some instances brief palliation was afforded in 35 per cent and an appreciable and prolonged palliation was achieved in an additional 15 per cent of the series. Given adequate conditions, a more radical attitude in the surgical treatment of advanced abdominal cancer would appear justifiable.

CHARLES BARON M.D.

#### GYNECOLOGY

#### UTERUS

Clift A. F. i Observations on Certain Rheological Properties of Human Cerrical Secretion Free E. Sec. M. Lond. 1915, 39, 1

Cernical mucus the most other secretions of the body is not a true fluid because it does not flow at a steady rate under con tant pressure. Lutther more when pressure is increased the rat of flow does not increase proportionately. Such secretions are complex systems characterized by properties such as anomalous secousty claticity th wells toty. Spinnharkest and adherivenes. A stuly of such physical properties; called theology.

Experimental evidence and num rous clinical observations suggest that the theological properties of human cervical mucus undergo a cyclic variation in the menstrual cycl and furthermor bear direct relation to ovulation to penetrability of cervical mucus by permatozoa and to pregrance

This auth it has furcted his attention primarily to the study of two hithert unreconnect declored; projecties of cervical mucu main by, flow cla ticity and Spinnharkeit. When a material showing flow cla ticity i caused to flow along a tube and the pressure is suid fenly rel ased the material recoil towards its original position. The property is accurately measured in the mensionscope as in triment which consist seventially of a graduated gla capillary tube. One code of the tube it open the other his triphtly on to a systeme A small safe table for the control and sudden release of pressure is interposed between the syringe, and the main tube.

Spinnbarkets is the capacity of legible to be drawn into threads. The most suitable linglish term now available is shown to "It is a projectly of cerman mucus and is capable of accurate measurement. The text is carried out by drawing away a coveral p placed on a blob of mucu and mea using in cent meters the thread thus produced.

The author stresses the foll aine pant a spice

requirite of interpretation of result

The cervix must be health; with ne pathological tear marked erosion or endoc rote to
 Contamination with blood should be reduced.

t aminimam

- 3 The pecimen must be collected from the cervical canal not from the vaginal vault or from the external cervical os.
- 4. Neither douching nor coitus must have taken place during the 48 hours preceding collection.
- 5. No antiseptics should be used in collecting the sample
- 6 The test for flow-elasticity (elastic recoil) hould be performed within 20 minutes of collection of the sample.
- The cervical mucus of 26 women showing normal menstrual cycles wa studied. Seven of these w men

were seen more than once, 3 were studied for a least one complete evels and 2 became preparant during observation. How-elasticity and Sphaldar Leit were measured. The amount of mours secretation of the macro-copic appearance and the number of leurco; tes contained in the specimen were also noted. These properties were carefully correlated with the time of the menstrual cycle or pregnancy and they supply two new theological tests.

A throboxical test for ovulation in woman is described. The sample of cervical mucus is muna and homogeneously translucent. Flow-clustely subspanning that maximum. The cellular content is minimal. At this time penetrability and longerity of strematics are retasters.

A theolysical lest for preparancy in somato is described. The sample of cervical mucus is thick and bomogeneously opaque. The mucus is difficult to draw into the mentioscope and there is about complet absence of flow-classicity and Spinolarical.

These rheological phenomena and tests should prove of value in the recognition of orulation and anovulator, cycles in the investigation and treat ment of some forms of sterility (cervical hostility) in various types of orarian dysfunction, and in application as access in tests for pregnancy

L. J. MTS TALBOT M.D.

Curtls, A. II : Hypertrophy of the Uterus. In J Old 1945 to 745.

The u ual symptoms of hypertrophy of the uterus are prolonged or excessive menstruation pelver pressure with more or less aching discomfort, and increased vaginal lischarge.

Examination reveals an enlarged uterns which is usually heavy often tetrologistical, and difficult to differentiate on bimanual examination from adomysms of the uterus or diffuse enlargement from deeply bened myomas. Di rentation from air comma d the lody of the uteru is sometimes difficult occasinally even after examination of uteriar currentings in the cases of hypertrophy with marked on longitally hyperpla is

It tological diagnost of the various types of uterine hypertrophy is includated by differential time. With routine hematoxylin and coolin atamenlarged and thickened blood revest and the amount of perivacular connective tissue are readily reconized but accurate determination of the resultiproportion of connective tissue and muscle cells is not simple. Varietnome stain similar to the Mailory stain helps to solve this difficulty.

The more enlarged uterl are studied the more apparent it becomes that variou gradations of hypertrophy are encountered in most instances and that pure subinovalution or true diffuse hypertrophy of hypertrophy to metritis or to enforcing

d turbance i unusual

Curettage may be required for differential diag nosis, and strangely enough, it is sometimes bene ficial. If more important surgical intervention is required, one should hesitate to perform corrective operations for uterms displacement in these cases unless childbearing is an important issue removal of the oflending organ by subtotal or complete hyster ectomy is the procedure of choice

EDWARD L. CORNELL, M D.

Waterman, G. W., and DiLeone, R.: Treatment of Carchooma of the Cervix with Interatitial Radium Needles at the Rhode Island Hospital Am. J. Ohr. 1945, 50–483

The authors report first the 10 year survival rates on 300 cases from 1936 through 1933 which were previously reported for five year survivals second they add a new senes of 198 cases which passed through the Clinic from 1934 through 1938 and third they review the total of 507 cases from 1036 through 1038

An improvement in the results in the last three years from 1936 through 1938 in 127 cases is shown

The effect of age on the extent of growth when first seen (clinical stage) and on the prognosis (five year survival rate) is shown

The incidence of adenocarcinoma, carcinoma complicating pregnancy bone metastases generalized metastases, and cancer primary in a second organ is given for this series

TABLE I —SURVIVAL RATE BY YEARS I TO 10 FROM 1926 TO 1933—309 CASES

******						
Stage	(Schoolts) per cent	No.		erm el	1 servival per cra	
I	4.5	5	1	73	7	46
11	3 7	95	11	54	10	#0
111	35 6	1	16	3	3	
71	27-0	\$6				
Compette	100	300	90	3 3	69	3
Relative	1	-	-	117	60	24.5

TABLE 2 —FIVE YEAR SURVIVALS—127 CASES FROM 1936 TO 1938 LAST 3 YEARS

Reps	(Schoolts) per cent	No.	Yr.	¥	3 Y .	43.	ş Y .	s Y per cent
I	1.3	3		3	3	1	1	100.0
п	30	18	34	30	27	57	20	60
ш	48	- ét	42	30			1	p8.5
IA	197	5		3	3	,	3	4
Absolute	100	237	37	65	34	,	30	39.3
Not treated	143	18		_	1	-	-	
Relative	\$4.7	100			1	_	40	44.0

<sup>18</sup> cases—manifes not used as primary method. One treated elevaters serviced 5 years.

The good results previously reported from the use of internitial long platinum needles of low internity are maintained in this series and with the added use of x ray therapy in the last consecutive roo treated case, are definitely improved.

Through a more carefully worked out distribution and spacing of the radium sources as suggested by a study of dosage and five-year survival rates it is hoped that these results may be further improved

EDWARD L. CORNELL, M.D.

#### ADNEXAL AND PERIUTERINE CONDITIONS

Ziegler E. E.: Bilateral Ovarian Carcinoma in a Fetna 30 Weeka Old Arck. Path. Chic. 1945 40 270.

This is a case report of a carcinoma which apparently was a dysperminoma arising from granulosa cells in a fetus weighing 1,340 gm, and estimated to be thirty weeks old

At the routine autopsy the ovaries were slightly enlarged and graytth pink in color. They aroused no special interest during the autopsy and the tissues were removed and sectioned routinely. Histological examination however showed that the entire substance of each gland was practically replaced by car commutous tissue. The cancer cells contained numer ous mitotic figures. Scattered through the neoplasm were numerous primitive grantian follicles. In some places the granulosa cells accmed to show stages of transition into neoplastic cells. This gave the impression that the tumor was a granulous cell carcinoma. The tumor cells themselves, however resem bled those of dysgerminoms, and there was a delicate tumor stroma between the masses of tumor cells which also resembled the stroms of the well known dyagerminoms. There were no gross or microscopic evidences of extension or metastases.

The mother of this infant is living and well and has since given birth to a full term well developed,

normal appearing infant.

The occurrence of neoplasia in childhood in in fancy and now in fetal life seems to lend weight to the opinion of those who believe in the Importance of hereditary as opposed to environmental factors in the causation of cancer it seems to midcate that at least some cancers may occur without the operation of extremic environmental factors.

SAMUEL J FORELSON M.D.

#### MISCELLANEOUS

Grailet, H. E.: The Use of Prostignine in the Treat ment of Amenorrhes and as a Pregnancy Test (De l'emploi de la prosilgnine dans le traitement de l'amenorrhée et comme test de grossesse). Res f gra. dels 1042 40-150.

Emmenagogues such as apiol ergot, and yohim bine were formerly used to start menatruation because they produced congestion in the pelvic organs. They have been replaced by sexual hor mones but recent studies again focus attention on the rôle of hyperemia in the mechanism of menstrus tion. It has been shown that hormones produce histological transformation of the uterine mucoes which the older drugs were not able to cause, but the ability to create hyperemia and uterine bleeding is common to both groups of drugs Estrogenic hor mones have a double effect (1) a specific action and (s) a nonspecific action related to the phenomenon of hyperemia. Both male and female sexual hor mones display a vasomotor effect, attributable to the ability to liberate a certain amount of acetylcholine which acts on the blood vessels through the parasympathetic system Acetylcholine is produced in situ and not in remote places. Such effect is of short duration not exceeding 12 hours because a hydrolytic disintegration of the acetylcholine occurs under the influence of the enzyme cholinesterase present all alone the nerve fibers.

Many authors consider that the menstruation results from a vasoditating reflex comparable with erection. Retardation of the menstruation without apparent cause may be attributed to a nervous factor responsible for an insufficiency of the vascular response with a glandular system intact. To remedy such condutions prostignate has been suggested instead of acetylcholine because it acts on the parasympathetic system by inhibition of the cholinesterase without the dangers associated with acetylcholine. In the manner a rapid disintegration of acetylcholine in the tissue is inhibited and thus a

nterme hyperemia is facilitated

The author employed prostigmine in 86 patients and could check the results in 75. A menstrual delay

of from 5 days to several weeks was recorded in the histories. The material consisted of 30 cases of pregnancy to monpregnant cases in which endocrina or organic disorders could be excluded and the amenorrhees had to be considered as accklental, and the remainder in which the patients had probable or

manifest endocrine disorders.

The author concludes from his investigation that three consecutive injections of proviginite in women who usually have a normal meastrastion are followed by bleeding, usually typical meastral bleeding. In women in whom an organic or endo-cane disorder h suspected such prompt result is considerably less frequent and usually appears only if the injections coincide with the luterial phase. No uterine bleeding occurs if amenorrhes is due to preguancy. Therefore prottigmine injections may be used as an early diagnostic pregnancy test. If no bleeding follows a injections of prostigmine in patients without any evidence of endocrine or organic disorders. He no possibility of pregnancy though the proposition of prostigmine in patients without any evidence of endocrine or organic

considered

The patient should be informed that the injections

will not provole an abortion.

In 14 nonpregnant patients treated with postignaine a bloody show appeared within 6 days after the last injection in patients with amenories postpartum the time which elapsed between the injections and the bleeding was long enough to create doubt as to the efficiency of protrimine.

The author expresses doubt as to the efficiency of prostlemine in amenorrhea caused by endocrate disturbances.

#### OBSTETRICS

#### PREGNANCY AND ITS COMPLICATIONS

#### Bernstine, J. B.: Vaccination during Pregnancy as a Prophylaxis against Puerperal Infections Med Clin N America 1945 29 1495

The investigator undertook to culture the type of organisms commonly found in puerperal infection test their effect on laboratory animals and by means of a vaccine made from the cultures, clevate the immunity of the pregnant woman to such infections.

Cultures were taken from the cervix and endocervix of pregnant women with a sterile cotton swab placed in a tube of blood agar and subcultured within 30 minutes. The culture media consisted of s per cent defibrinated horse blood agar plates beef infusion broth, #H 76 and plain 25 per cent infu sion agar plates and alants. The common organisms found were the staphylococcus albus streptococcus viridans the diphtheroids nonhemolytic streptococcus and hardling authorities.

After a vaccine was prepared as explained in detail in the original article a groups of mice were moculated with various strengths of the vaccine Following the study on mice, to female patients in the childbearing period were selected. No reactions occurred in this group therefore 471 patients attend ing the maternity clinic at Jefferson Medical College Hospital Philadelphia, were moculated There was no particular selection of the patients and later at the time of delivery it was not revealed which patients had been inoculated

The initial injection was 1 minim with subsequent injections of 4, 8, 12 and 16 minims. The number of injections varied from 8 to 30. The majority of patients received their injections from the fourth to ninth month. There was a noted absence of reactions in these women.

In this series of vaccinated patients, 4 , per cent were morbid during the puerperium as compared with the nonvaccinated group whose morbidity was 17 1 per cent. This study concluded a series of 973 patients who were vaccinated 502 having been reported upon in preceding papers.

CATHERDOR B HISS M D

Duran A.: Axial Torsion of the Myomatous and Pregnant Uterus (Torsion axial del utero mioma toso y gravido) Bel Sec chilene ebst gin 1945 to rig.

Axial torsion of the myomatous and pregnant uterus is very rare. The author has found only 2 cases in the literature before he encountered the one reported in this article. This case was in a woman of 38 years who was found to have a nodular myoma of the uterus complicated by a pregnancy of 11/4 months. The myoma was removed the denuded surface covered with bladder peritoneum and the wound sutured The woman made a complete re

covery and the pregnancy continued without interruption. The other 2 cases are reviewed briefly

The name axial torsion is not really correct as this would indicate a torsion of the whole organ around its axis while as a matter of fact there is a rotation only of the body of the uterus around the supravaginal part of the cervix which is lengthened and softened by the existing conditions. The rotal tion may be to the right or left and may be as much as 180 degrees, so that the anterior surface of the uterus looks backward. Torsion of a nonpregnant myomatous uterus may be as much as 460 degrees Factors in the torsion are the weight volume and site of implantation of the tumor and the softening and elongation of the 1sthmic portion of the uterus brought about by the pregnancy The torsion causes a sudden intense pain irradiating over the whole abdomen, accompanied by syncope a small rapid pulse vomiting cold sweat, and dyspnes. The tem perature is normal and there is dissociation between the pulse and temperature. Abdominal paination reveals muscle rigidity and intense sensitiveness. In cases in which the torsion takes place gradually the symptoms are slight.

Operation should be performed as soon as the diagnosis is made detorsion is generally not difficult the uterus may be fixed in position by Passeron s hysteropexy or Pestalozza s pelvic hysterectomy the myoma removed and the denuded zones covered with peritoneum. If the torsion has caused serious circulatory disturbances such as extensive extra vasations of blood infarcts or zones of gangrene the uterus must be removed. If no great circulators changes have taken place and the myomectomy has left the wall of the uterus in good condition the preg nancy may continue However if the site of im plantation of the myoms is very large or serious nutritive disturbances of the wall of the uterus have taken place the uterus may rupture

AUDREY G MORGAN MLD

#### PUERPERIUM AND ITS COMPLICATIONS

Rosenblum, G. Melinkoff E. and Fist IL S: Early Rising in the Puerperlum J 1m M Ass 1045 120 849

The practice of early rising of parturient women dates back to ancient times. Although it was recently stimulated by the wartime shortage of obstetric beds it did not arise from that emergency The nuerperlum or time of rest given to women in childbed has varied more widely in the customs of different peoples than any other feature of that great physiological function of woman

The practice of early ambulation of surgical pa tients now a widely accepted procedure and advocated by hundreds of articles in the American and foreign literature must be considered intimately related to the practice of early puerperal rising. The objectives and underlying principles of the two are identical.

With a background of favorable evidence in the literature the task of studying early ambulation in the puerperium was begun. At the outset it was realized that there would be objections both from natients and from the medical profession to the practice of early ambulation. The following objections arose during the course of their study

The objections of doctors were (1) fear of medicolegal consequences, (2) fear that episiotomics would break down (3) fear that there might be too much strain on the pelvic floor resulting in prolapses and retroversions, (4) fear of excessive post partum bleeding and (5) fear that patients would

not approve of early rading The objections of the patients were (1) that the procedure was unfamiliar to them, therefore they were not sure it was good (2) that they needed rest and it musht tire them too much to get up (a) that they were too weak to walk, (a) that arising might make them bleed too much and (5) that they might

break their stitches. A group of 382 obstetric patients who were studied were divided into three groups as follows (s) 227 early risers ambulatory on the first or second post partum day (2) 100 intermediate risers, ambulators on the third or fourth postpartum day and (1) 220 late risers ambulatory later than the fourth nost partum day

The study of bladder function showed a close similarity of the catheterization curves for the three groups. The contention that early puerperal rising may cause excessive bleeding is disproved by the statistics, which show actually less frequent abnormal bleeding in the early group than in the late group Involution of the uterus was uniformly good in all groups. The fear that early rising would cause a breakdown of episiotomy or abdominal wound incipions is likewise unfounded, only I instance of perineal skin separation occurring in the entire series, and this in a patient in the late rising group. More efficient mobilization of the bowels was evident as more than three times as many spontaneous bowel movements occurred in the early as in the late group

The total number of complications in the entire series was very small, and there was no significant difference among the three groups. As there were no patients having emboli or thromboses in the entire series, the contention of many previous authors that late rising fosters these complications was not proved in this series. However a study of a much larger series might possibly reveal a lower incidence of these complications in the early risers.

The claim advanced by some obstetricians that

early rising may cause later prolapse and retrover sions is also disproved. Of the early risers examined at I month and at 6 weeks 18.7 per cent had either a midposition or retroversion of the uterus, while 34 6 per cent of the intermediate and 244 per cent of the later risers had the same positions - relatively similar totals. This indicated that early rising cares no significant alteration in the position of the uteres. at least within a period of from 4 to 6 weeks follow ing delivery Prolapse did not occur in any patient in the entire series.

The nurses working in the obstetric department reported a decided reduction in the amount of nuring care required for patients rising early. The noted better morale and less discomfort in the

group

Particularly favorable are the reports concerning cesarean sections in which cases less abdominal distention and discomfort, and a much more rapid one valescence was noted.

No patient in either the early or the intermediate group offered any criticism concerning the early rusing in fact, the majority exhibited enthusiasm. The multiparas especially were impressed, statur that they felt better and stronger than they had after previous confinements, when they had speat a period of from 7 to 14 days in bed.

CHARLES BURGS, M.D.

#### MISCELLAMEOUS

Van Watenen, G.: The Optimal Mating Time for Prenuncy in the Monkey Enterinder 1841. \$7 307

Since the rhesus monkey (macaca mulatta) is the laboratory animal of choice for the study of the physiology in reproduction, any knowledge concerning the optimal mating time for pregnancy is of considerable interest.

The author reports on a series of observations extended over a 5 year period on monkey breeding During this study a rigorously standardized plin for mating at a particular time in the mensurual cycle was used

The routine procedure was to place the female on the eleventh day of her menstrual cycle in the cage of a male for a period of forty-eight hours. Thirty two per cent of such matines resulted in pregnancy Another forty-eight hour mating starting on the thirteenth day of the menatrual cycle resulted in pregnancies in 24 per cent of the cases.

Another series of a5 monkeys were studied and their mating date was delayed to the seventeenth day of the menstrual cycle. These animals were mated more than an average of three times each, eighty times in all, but at the end of a months only I pregnancy had been effected. In contrast, when the remaining 24 monkeys then were mated on the eleventh day of their next cycle 7 of them became

pregnant. The author concludes that in this particular monkey the period between the eleventh and thirteenth days of the menstrual cycle is the preferred time for HARRY FIXIDS, M.D. mating

## GENITOURINARY SURGERY

#### ADRENAL KIDNEY AND URETER

Huddins, C. B., and Scott W W : Bilateral Adrena lectomy in Prostatic Cancer Ann Surg 1045 112 1011

Abundant use of plasma transfusions seems to be of great importance in the prevention of circulatory collapse following adrenalectomy in man.

The author states that inadequate therapy after adrenalectomy in man results in early hypernyrema and hypotension the carbohydrate metabolism is not drastically disturbed. In the adrenalless man adequately treated with plasma adrenal cortical extract, and desoxycorticosterone acetate these effects were not observed but addisonian prementa tion occurred on the sixteenth postoperative day

and was progressive

Complete adrenalectomy in castrate man results in a reduction of 17 ketosteroids to values less than 2 mgm, excreted in the urine daily total ketonic, and alpha fractions are greatly diminished. Urinary androgens as measured by the comb-growth tech nique are absent. There is a continued excretion of small amounts of estrogen. In a man who survived complete adrenalectomy for 116 days there was a sustained reduction of alkaline phosphatase activity of the serum but the prostatic cancer progressed although apparently at a retarded rate. The inection of desoxycorticosterone acetate elevated the blood pressure to normal levels but hypertension did not occur with massive doses

The extragonadal androgenic depot in man is the

adrenal.

Adrenalectomy is not a practical method of treat ment of the failure-group of patients with prostatic cancer treated by antiandrogenic methods

Three factors, whose presence and significance vary in the human prostatic cancers may be stated (t) the testicular androgens (2) the extragonadal depot and (3) androgen-dependence or its opposite adrogen independence. It is not vet possible to de fine androgen-dependence or independence in chemical terms. IOUN A. LOUY M.D.

Horts, J S.: The Question of Origin of Grawitz Tumora (El problema del origen de los tumores de Grawita) Arch. espan urol 1945 2 115

There is no unanimity of opinions as to the origin of Grawitz tumors but at present there is more and more tendency to accept the renal theory Modern biological studies of the functions of tumors originat ing in endocrine glands justify a revision of the older theories pertaining to the origin of Grawits tumors.

A priori we may consider Grawitz tumors as originating from a normal structure of the adult kid ney Apparently such neoplasms do not derive from intrarenal inclusions of the suprarenal glands There are arguments based on morphologic and bio-

logical considerations which tend to show that hy pernephroma does not originate from aberrant

suprarenal glands within the kidney

Undoubtedly there is a great microscopic similar it) between such tumors and the suprarenal cortex. In many cases it is impossible to distinguish microscopically a hypernephroma from the suprarenal cortex in both, the fat and glycogen are present in very small amounts or they are absent entirely cellular protoplasm is scanty and fusiform forma tions are present. Ewing maintains that nondiffer entiated cells frequently found in a suprarenal car cinoma, are not present in the renal glands.

Sarcomatous structures may be present in Grawitz tumors as well as in the suprarenal cortex. The author shares Ewing's opinion as well as that of Apits who maintains that both Grawitz tumors and those of the suprarenal cortex may have a sar comatous structure which derives from epithelial cells the renal epithelium and that of the suprarenal

glands are of mesothelial origin

Frequency of papillae and lucid spaces is charac teristic for parenchymatous tumors of the kidney while in corticoruntarenalomas they are very rare Such formations in suprarenal cortex tumors are of glandular origin Under low power both kinds of tumors may look identical but under high power cells of renal tumors show a typical veretative aspect only the exoplasm is stained while the remaining cytoplasm remains colorless. Large fat droplets may be seen in sections of Grawitz tumors stained with Sudan III while the droplets are very small in The vegetative aspect of corticosuprarenalomas. cells in renal tumors is caused by the accumulation of glycogen That cellular formations are practically reduced to cytoplasm in corticosuprarenal tumors cannot be denied but according to the author's connon such images are secondary

The fact that hypernephromas do not produce alterations of the sex characteristics of the host is interpreted by some writers as an argument against the suprarenal theory. Not all tumors of the supra renal cortex are accompanied by such modifications. From the hormonal point of view the cortical tumors may be divided into (1) those which do not produce hormonal changes (2) those which are accompanied by an excess formation of estrogens, (3) those with a symptomatology related to the excessive production of metabolic steroids and (4) those accompanied by an increased excretion of androgens and steroids. To the author's knowledge not a single case of renal hypernephroma with virilism has been reported in the literature.

The presence of numerous vacuoles in suprarenal tumors but not in hypernephromas is stressed

Contrary to the rarity of aberrant suprarenal nodules of the kidney aberrant Grawitz tumors are relatively frequent.

The author believes that there are sufficient arguments in favor of the theory which claims that Grawitz tumors do not originate from suprarenal tissues.

Renal hypernephroma belongs to the group of neoplasms of the endocrine glands characterized by the presence of lucid cells such as benign corticosuprarenal tumors, luteinomas or hypernephromas of the ovaries tumors of the interstitial gland of the testes, and parastrumas.

Hypernephromas of the kidney are sometimes accompanied by hypertension but it has been pointed out that no definite relations exist between these two conditions hypertension may persist after nephrectomy has been performed on account of the

presence of a Grawitz tumor

Hypernephromas possibly originate from myoepithelial formations described by Goormaghtigh, who considers them as regulators of the circulation within the glomeruli. Joseph K Nahar M D

Santaella, R. A. 1 oluminous Pyonephrosis and Ita Treatment (Las pionefrosis vol minosas y su tratamiento) irch espan ural 1945 2 2

The author advocates a nephrectomy in two stages in the treatment of extensive properphrosis. His clinical observations and anatomorpathological studies demonstrated the advisability of such staged procedure. Perifocal scientific reaction safeguards against a spreading infection by establishing a defemitive blockade. Lauaily 1 month is allowed to eliapse between the first stage which consists of nephrostomy and insertion of a Pezzer catheter and the second stage, the nephrectomy proper. The operation is performed only if the functional capacity of the kidney in good. The hillus is ligated en masse Frequently the author leaves a clamp on the pedicle for a wresh.

Six cases in which two stage operations were performed are described in detail

TORREST & NARAT M D

Castro E P: Renal Tuberculoma (Tuberculoma renal) Arck espon and 045 50-

The author reports a case of renal tuberculoma in a 33 year old man who had repeated attacks of pain in the hypogastrium, combined with a great of pain in the hypogastrium, combined with great painter the application. The painter has been aftern the application of the painter had been as completed and the state of the combined with the combined with the combined and the painter had ministration of pyridium. Three combinates the administration of pyridium Three combinates the patient was admitted to the box pital. \( \text{\text{ny}} \) studies decised a dense homogeneous, well circumstribed shadow extending from the right hillum region to the diaphragm. There was a clear space in the center of the shadow. Hematological and bacternological studies established the diagnosis of pulmonary abscess. The patient was trrasted with short waves.

The expectoration and fever subsided and the second roentgenogram showed evidence of cicatrization of the pulmonary abscess and the existence of bronchiectasis in the right lower lobe. The patient complained of vague pains in the left recal region and the epigastrium. The urine contained a large amount of pus. Chromocystoscopic examination showed a normal function of the right killery while after the injection of indigocarmine only very pain failed was excaping from the left ureter Retrograde pyleography showed a large cavity above the upper callys, with irregular outlines after instrument urography an image of the cavity in the left killery was obtained.

A nephrectomy was performed with great difficulty on account of adhesions around the upper pole of the kidney. The patient made an unerventful recovery.

The histological examination revealed a tuberuloma of the kidney with numerous Langhans' gant cells, epithelia cells and lymphocytes. There was an intensive sciencide reaction. The glomeroll kad undergone a hyuline degeneration. Extensive necrotic zones were spread throughout the entire renal tissue in the involved region.

The symptomatology and the roentgenographic studies pointed to a renal neoplasm. The inspection of the extirpated kidney also suggested a tumor

rather than renal tuberculosis.

A check-up 2 years later showed the patient to be in perfect health Joszes K. Nakar M.D.

Gorro A. P : Partial Nephrectomy (Nefrectomia parcial) fresh explor grad 1945, 1 29.

A partial nephrectomy is indicated when a cur conscribed area of the kidney is involved the remaining parenchyma appears normal, and the ercretory prelouteteral portion is not affected. An excretive mutilation of the organ in such cases is not justified.

Partial nephrectomy advocated by a number of older writers, was later discredited on account of operative or postoperative henorrhages, and the formation of obstibate urinary fixulas which required an ultimate extingation of the organ. Furthermore, improper indications such as the presence of a malignant necolasm or of tuberculosis of the kidney also discredited the operation.

Recent advances in prological diagnosis, such as prographic studies, and improvement of the tech-

moue rehabilitated the operation.

Experiments on animals show that a portion of the renal partnethyma corresponding to one-fourth of the entire amount of both kidneys is sufficient for the survival of the animal. An entirpation of a portion of the kidney does not unfavorably after bet rather improves, the function of the remaining part of the kidney.

A decision to resect only one part of the kilosy cannot frequently be made until the surpros is afte to inspect the organ. Conditions of the blood supply and permeability of the pyrioureteral system are the most important factors to be considered. Aortic arteriography before the operation may furnish valuable information as to the blood supply to the kidney Pyelography furnishes information as to the condition of the excretory pyeloureteral apparatus.

Partial nephrectomy is indicated in in partial hydronephrosis located at one of the poles of the hidney. If lesions caused by a stone are extensive, a simple extraction of the calculus does not assure anatomic restitution of the involved parenchyma and in such cases a partial nephrectomy furnishes excellent results because it prevents an extension of the inflammatory process. A partial nephrectomy is indicated if a larve solitary cyst is present.

If a hydatidiform cyst does not communicate with the excretory ducts, a partial resection of the kidney may be considered. If in a polycystic kidney the changes are confined chiefly to one portion of the organ, the affected area may be removed and the cysts disseminated over the surface of the kidney.

may be destroyed with the cautery

Sometimes abnormal blood vessels interfere with pyeloureteral evacuation and in such cases a section of the abnormal blood vessels which may lead to an ischemia of the corresponding part of the kidney may be avoided by a prophylactic partial nephrec tomy. Otherwise a septic necroblosis may result

If a destructive renal infection is confined to one portion of the organ, the affected area may be re

sected and a drain inserted.

Only on rare occasions is a partial nephrectomy indicated in renal tuberculosis. This may be the case if the infection affects a kidney with a double preloureteral system which permits a functional and romigeographic study of both portions of the kidney. Such studies may reveal an integrity of one

part of the kidney

Anomalies of the renal pelvis with or without infection may show that two parts of the kidney function independently of one another. In such cases a plastic pycloureteral operation, when there as congenital anomaly may supplement a partial reaction of the kidney. Such an operation may be considered if a benign neoplasm involves only one part of the kidney.

In many cases of injury of the kidney a partial

resection of the organ is justified

One of the drawbacks of a partial resection is the hemorrhage this can easily be stopped with the electrocautery. The second drawback is the difficulty encountered in the determination of the extent of the lesion. Reentgenographic studies are

extremely valuable in this respect

A few essential points in the technique must be the tin mind. The blood vessels supplying the portion to be resected should be ligated prior to the resection, especially if one is dealing with an abound kidney. Many authors described a technique of approximation of the wound edges. However in many instances the wound in the kidney cannot be closed without an insertion of a flap consisting of muscle tissue and aponeurosis. Such portions of the tissues may be obtained from the external oblique muscle. Diffici lites in approximating the edges are encountered when a transverse or a wedge shaped

incusion is made in the kidney. The inserted muscul loaponeurotic strip is kept in place with interrupted catgut sutures. The author uses interrupted catgut sutures for approximation of the edges which transfix the parenchyma and the fibrous capsule.

Efficient extrarenal drainage for from 8 to 12 days provides evacuation of the extravasated urine. Otherwise an infiltration of the soft tissues with

abscess formation may result.

The author performed a partial nephrectomy on to patients. He encountered the following anatomic abnormalities a superior polar artery both superior and inferior polar arteries double renal pelvis, and a normal kidney with a double pelvis and ureter. The following pathological conditions were found pythosphatic indection hypoplasia with a complete double ureter tuberculosis of a kidney with a double pelvis and ureter infected hydrone phrosis with a double pelvis and ureter infected hydrone phrosis with a double pelvis calculous pyonephrosis with a double pelvis lithiasis with infection tumor of the kidney, hydronephrosis inferior polar artery circumscribed dilastion of a calyx and traumatic rupture of the kidney.

In 5 cases transparenchymal drainage of the renal pelvas was employed in 4 cases the unine was escaping from the lumbar incision for a few days following the operation. In 3 patients the urinary discharge stopped spontaneously between the fifth and tenth postoperative days while in the remain ling 3 cases the discharge lasted from 3 to 4 weeks In 1 patient a urinary fistula opened and closed repeatedly for a few months until a small stone was expelled spontaneously. In 1 patient symptoms of an acute pyelonephrite infection developed. The condition was attributed to a premature removal of the intrarenal drain on the tenth postoperative day Following the introduction of a ureteral retention eathers the infection subsided in so days.

TORKPR K. NARAT MLD

Frostad H: Urinary Stasis and Pains after Cyst oscopy with Catheterization of the Ureters. Acta chir scand 1945 98 546

Frostad studied of cases in which preliminary intravenous pyelography excluded utinary tracticalcula and in which pain or colic followed retrograde pyelography. After ureteral extheterization patients frequently complain of pain, and the urine from one or both ureters is bloody. Postcystoacopic intravenous pyelography demonstrated a characteristic urinary stass on the affected side. In 3 cases removal of a blood clot projecting from a ureteral ornice resulted in immediate censation of the pain. In the series cases with reduced renal function were excluded.

Protuneteral catheterization pain usually starts in one or both lumbar regions and in 2 to 3 hours gradually spreads downward along the course of the ureter to the inguinal regions. The pains may vary in intensity corresponding to ureteral peristales. They seldom begin quite suddenly as in calculous. 112 They colic, but begin and decrease gradually conc. out negin and decrease gradually and usually begin a few hours after completion of the usually begin a new nours after completion of ind-cystoscopy Of the 95 patients, 33 had postcathcystoscopy Of the 95 patients, 33 had postcath-eterization pain. Pain usually occurred when bleed eterization pain. Fain usuary occurred when been ing was most excessive during collection of the ing was most excessive during collection of the ureteral catheter specimens. A fairly constant reureters; catheter specimens. A samy constant re-lationship between the intensity of the pain and the ationship between the intensity of the pain and the amount of bleeding during collection of the speci

Of the 33 patients with postcathetenzation pain, mens was present. or the 33 patients with postcatheternation pain, 28 had intravenous pyelography immediately after commencement of the pain. In all cases more or communications of the paint in an ease more of and the duration of the stasis varied from a to 6 and the duration of the stans varied from a to o hours. When the pairs disappeared, the stank dis nours. When the pains disappeared, the statis of continued at once Among 19 cases without pain, intraversous pyelography did not demonstrate statis intravenous pycoography did not demonstrate states in any instance. Other causes of stasis, such as cal

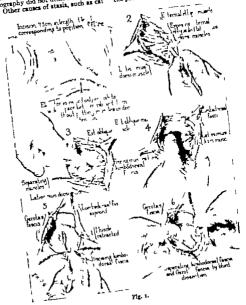
culi ureteral rupture, gravidity adjacent tumon or cuis ureteras rupture, gravatity anjacent tumon or abscesses, and allergic reactions would have been ruled out by the preliminary intravenous urography The most probable cause of stars is the formation The most processe cause of stars in the formation of blood clots which for a time obstruct the unitr

after ureteral catheterization. DAYTO RODOSTICOM 11 D

Prince, C. L.: Lumber Ursterollthotomy; The Foley Operation. J Ural., Balt., 1945 54 168.

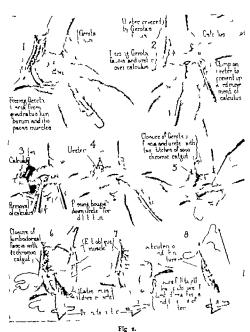
The intention of Prince is to bring to the attention and intention of Prince is to oring to the attention of the surgical profession the simple operation of on the subgress profession the subpse operation or lumbar ureternlithotomy which was introduced in 1935 by F. E. B. Foley

The author believes that 1935 by r L. B roley the author believes that this simple procedure with no cutting of muscles, this sumple procedure with no cutting of musics, without freeing of the ureter with ease of exposure, without freeing of the uterer with case of expanse, and with rapid convalescence has been neglected by the profession



Details of the operative technique including excellent illustrations by Didusch are given (Figs 1 and a) Briefly exposure of the ureter in its upper third consists of making a short (7 or 8 cm ) incision parallel to the twelfth rib with the midpoint of the incision at the end of the twelfth rib and at a distance below the rib equal to the distance of the ureteral stone below the twelfth rib as determined with x rays Dissection is carried downward to the lumbodorsal iascia by bluntly separating the latissimus dorsi nosteriorly and the external and internal oblique antenorly, and atripping these muscles from the lum bodorsal fascia below The lumbodorsal fascia is then opened in the direction of its fibers and the fascia of Gerota stripped from its under surface The posterior layer of Gerota's fascia is separated bluntly from the quadratus lumborum and psoas muscles down to the vertebral bodies. At this point the ureter can be seen and opened the stone removed exploration made with bougies closure is easily accomplished. It consists of suture of the muscularis and penureteral tissues with interrupted fine catgut and then suture of the lumbodorsal fascus subcutaneous tissue and skin. A Penrose drain is placed for 2 or 3 days. The muscles do not require suturing

Convalencemen in these cases has been smooth There has been no shock or mortality. The average hospital stay following the Foley operation in 14 cases reported by the author was 7 days. During the usual muscle splitting and cutting procedure for stones in the upper third of the ureter the average hospital stay in 14 comparable cases was 18.4 days. William W Scort M D.



#### BLADDER, URETHRA, AND PENIS

Ballesteros, M t Cystometry (La cistometria) Rev and 1943 3 200

After a brief historical review of cystometry and a short description of the anatomic, pathological, and physiological conditions of the bladder the author describes various models of apparatus used for cystometric measurements and the technique of cystometry.

Cystometry is of great importance for the discovery of disturbances of the bladder function of neurogenic type or those caused by a reflex from adjoining organs. The method is particularly valu able in cases in which locomotor stars is combined

with hypertrophy of the prostatic gland The average figures obtained by the author differ somewhat from those published by North American workers. According to the author's investigation the pressure curve indicated a normal capacity of the bladder of from 150 to 300 c.c. The maximal voluntary pressure in normal individuals ranges from 32 to 52 mgm, of mercury. In hypertonic in dividuals the capacity of the bladder is below 100 c.c. and the maximal voluntary pressure exceeds 62 mem. of mercury while in hypotonic individuals the bladder capacity exceeds 300 c.c. and the maximal coluntary pressure remains below 32 mgm. of mer cury In normal individuals the curve ascends gradually while in hypertonic individuals it rises rapidly and in hypotonic patients it is low. The maximal physiological capacity of the bladder ranges from 200 to 700 c.c. Among cystometrographs, the one devised by Lloyd G Lewis is the most precise instrument the electrocystometrograph of Landes and Vorus is also a dependable apparatus.

Sphincterometric measurements are also of great importance as they supplement cystometric studies. The most complete cystometric apparatus is the

so-called microcystometer devised by Irving Simons. The author discusses various sources of error such as infection of the bladder excessive rapidity of the injection of the fluid, rectocele, explosede and diverticula of the bladder which may produce a hypotony of the detrusor muscle stones in the bladder and tumors or infectious processes which may produce hypertonia. Josan K. NAMI M D

Leifer W., Martin S. P., and Kirby W M M t The Treatment of Gonococcal Urethritis with Single Injections of Penkillin Beeswax Peanut Oil Mixtures \ Englad J M 945 833 583

The procedure and materials used for the treat ment of genomecal urethritis were essentially the same as those described by Romansky and Ritman in 1944 (Science 100 100). The visicid preparation —even when heated in an incubator or in a water bath at 37 C for 30 minutes—was withdrawn into a syringe by a 15 gauge needle and then injected into the buttock through a 10-gauge needle. The site of injection was not massaged. No local or systemle

manifestations of toxicity of any algalificance were botted. In most cases pain and tenderness were present at the site of injection for from at to 43 hours, but these were no more severe than when benticilly in saline solution is used.

In every patient treated in this series clinical improvement was noted initially dysoria subsided during the first six or eight hours and the portical discharge became mucoid and watery. By the end of the second day almost every patient was fire of symptoms and the urethral discharge had ceased.

symptoms and the utertural discharge had ceased.
One hundred and ninety two patients of the fost of any whom the authors treated by this method could be followed up for as days and only thee were considered in evaluating the results. In as of these treatment resulted in failure boxerer there was a clinical recurrence with the return of arthrib discharge, from which gonooced were cultured in only to in the other 1st the gonooccus was detected by bacteriological methods alone. All of the 2s patients in whom treatment was considered a failure were eventually cured by further penicillin-beens as

doses of penicillin in salio's solution.

In reviewing these results, no noteworthy effects due to the character of the excipient used, e.g. the percentage of becawax used, or the sait of penkillin employed (calcium or sodium) were noted, nor did the race of the pattent (engro or while) make any difference, although the white pattents were foosd difference, although the white pattents were foosd to be alightly more refractory. Of the total 101 is the tastein who were followed up for 31 days, 85 were treated with 100 coo units of penkillin, and of these results of these 35 (1975) were cured. The remaining 13 patients were given 200,000 units and of these it were cured bowere the last group was too

small to be significant
From these results the authors conclude that a
single intramuscular injection of r o.c. of a minum
containing 200,000 units of penicillin in 4 to 6 per
cent becswar by volume in peasut oil appears to be
a highly satisfactory method of treating acros poscoreal unrefulits. Force W Brassman, M.D.

Costro E. P (Epithelioms of the Ursthra; Navicular Fosss (Epitelioms de uretra foss savicular) And, crion ared, 945 440.

The author collected 28 cases of epithelioms of the urethra from the literature and reports a case of his own in a man, aged 48 years, who had noticed an largement of the glans 8 months prior to the admission to the hospital. Simultaneously a henor thagic secretion began dripping from the nexts. Gradually burning pains developed and were responsible for impotence because they were laterium with recruitors.

There was a very marked phimosis. Palpation showed the glans to be transformed into a globular hard mass, painful to the touch. The local troupers ture was increased. A sanguincous secretion was escaping from the urethra. A catheter could not

be introduced because it was encountering a mass fust behind the meatus. The testes and epididymes were normal and no enlarged inguinal glands could be paloated. The Wassermann reaction was neva

A biopsy was performed and the examination of the piece removed from the endourethral mass established the diagnosis of a spinocellular epithelioma

An operation was performed under low spinal anesthesis. The involved portion of the penis was removed. An inspection of the specimen showed the entire navicular fossa to be occupied by a cauli flowerlike neoplasm.

Histological examination showed a malignant neoplasm connisting of the squamous type of epithelial cells which were penetrating the skin and forming numerous ramifications and anastomoses. The stroma was relatively scant. A hyaline degeneration of the epithelium was noticed in many places and there was evidence of a chronic inflammatory reaction in the stroma in the form of an infiltration with plasma cells, lymphocytes, and a few polynuclear cells. Mitoses were relatively few

Urethral epithelioma usually causes severe pain which interferes with micturation and sexual power The frequency of urination may be increased or a complete retention may develop. The latter may drappear when necrosis of the tumor re-establishes iree passage. As a rule symptoms of penurethritis accompany the induration. In doubtful cases a urethroscopic examination may be required. Biopsy allows the differentiation of an epithelioma from adenomafibroma, fibroma, or fibromyoma while serological examinations exclude syphilitic lesions. Inguinal adenopathies are relatively frequent

Chronic inflammatory strictures, fistules, and leucoplakia are considered as predisposing factors. In 60 per cent of the cases the tumor has been found in the perineal portion of the urethra.

The tumor may be either nodular or infiltrating Both types show a considerable peripheral growth. Necrosis of the tumor tissue may lead to the for mation of perturethral abscesses.

Metastases are found in the inguinal epigastric

and mesenteric regions.

Cylindrical cell formations or adenocarcinomas de riving from Littre s glands are rare and in the ma ority of cases a squamous-cell tumor is found. This is due to the frequent metaplasia of cylindrical urethral epithelium

The therapeutic method of choice is an amputa tion of the penis if the epithelioms is located in the anterior urethra. Involved inguinal glands should be removed. A removal of the testes is superfluous because they have an entirely independent lym-Phatic circulation

The prognosis is much worse if the epithelioms involves the posterior urethra while chances of cure are reasonably good if the tumor is confined to the anterior portion.

An early diagnosis is essential

JOSEPH K NARAT M.D.

#### GENITAL ORGANS

Boyd, H. L. The Use of Thrombin (Topical) in the Control of Bleeding Associated with Prostatic Surgery J Urol Balt. 1945 54 385

Boyd suggests the topical use of thrombin for the control of bleeding during and following perineal prostatectomy in the cases in which bleeding cannot be controlled by ligation of the bleeding points and the supplementary use of the Davis bag and gauge packing In his introductory remarks Boyd reviews the previous successful use of thrombin by O Conner. in cases of excessive hemorrhage following transurethral electroresection and suprapuble prostatee tomy

In 12 cases of excessive bleeding following perineal prostatectomy in which control by ordinary means proved impossible thrombin was used. The tech nique is given in detail and consists briefly of the application of a gauze sponge (z inches long) soaked in thrombin solution (5 000 units in 10 cc. of normal saline solution) to the bleeding areas within the prostatic capsule the sponge being brought out of the wound beside the Davis bag

In 1 case in which the Davis bag became partfally deflated and passed into the prostatic bed profuse bleeding was controlled by clamping the Davis bag introducing the thrombin solution through the urethra, clamping the urethra and permitting no irrigation and no catheter drainage for a period of a hours.

In I case excessive bleeding was controlled with thrombin introduced and localized to the prostatic space by means of the Trattner partition catheter

WILLIAM W SCOTT M.D.

Millin T : Retropuble Prostatectomy; a New Ex travesical Technique Lancet Lond. 1945 249

The outstanding features of retropubic prostated 1 It is an extravesical procedure by which supra

pubic bladder drainage with its risk of alow closing or persistent fistula is avoided.

2 It is applicable to all types of prostatic obstruc

3 It is relatively short and shock free.

4 It appears to be anatomically sound no important organs being interfered with or endangered. 5 The mortality is singularly low No deaths

have occurred in the first 20 cases. 6 The postoperative course is easy for the patient

and attendant staff 7 The whole of the obstructing tissue is removed

so the risk of recurrent obstruction is obviated

8 The postoperative stay in the hospital seldom exceeds a weeks.

Preoperative treatment When the signs or symptoms suggest the necessity or desirability of oper ative intervention the usual preliminary tests of renal and cardiovascular functions are made. Par ticular emphasis is laid on preliminary intravenous

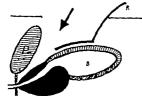


Fig. z. Retropuble approach to the prostate: P pubis, B bladder: R, retractor

urography From this study is ascertained evidence of ureteric dilatation, unexpected gross hydrone phrosis, vesical diverticulum, urinary calculi, and approximate residual urine without the necessity of urethral instrumentation. When actual retention has supervened suprapulse puncture is being treed initially with a small hydrocele trocar and cannula, and repeated when necessary until renal function studies have been made. When the initial puncture reveals infected urine, a No. 8 rubber Themann extheter is passed per urethram and retained in sits When the urine is uninfected and renal function adequate urethral instrumentation is not used be fore the patient is on the operating table.

Operative technique. The patient having been anesthetized either by low spinal anesthesia, with pentothal, or with pentothal and gas-oxygen, as indicated a rapid cystourethroscopic examination is made to rule out unexpected bladder pathology and to study the exact configuration of the gland The bladder is emptiod, and while the surgeon is changing his gloves and gown, the assistant prepares the operative field, i.e. the lower abdomen and penns. The penis is covered with a loose sterile towel. A midline incision is made starting over the publs and extending upward 11/2 or 3 inches, accord ing to the obesity of the patient. This is deepened in the usual manner and the aponeurosis is incised in the whole length of the wound Bleeding points are caught in bemostats and congulated with the disthermy needle. The recti are then separated in the midline and the index finger inserted at the lower extremity sweeps the retropubic fat and peritoneal fold upward. A modified Harris self retaining retractor is then introduced. The lateral blades keep the recti widely separated and the posterior blade

preses the bladder operard and backward (Fig. 1).
A flexible lamp resting on the publis is dipped into
the retropublic space thus opened up and the distribution of the veins coursing upward on the anterior and lateral supects of the prostate is noted, asthis appears to wary considerably. The veins are
situated in the preveitful layer of the endopevic
fuscia. The central lessh arising from the deep
dorsal vein of the pens is underrun with the boom-

erang needle and ligated. The group on each side is similarly treated. The fat still athermit to the lateral supects of the gland is gently supped downward and outward, any velus inadvertenily tora is this process being promptly seized with hemostate and subjected to disthermy. The anterior and alteral surfaces of the gland being cleared in this way a medium sized swab is pushed into each lateral recess.

With a diathermy knife or No. 15 Bard Parker knife a curved transverse incision, convex downward, 1 cm distal to the bladder neck, is made through the pre vesical fascia and true prostatic capsule. Suction is maintained to keep the field dry and to enable the operator to grasp any bleeding vessels in the distal lip with curved kocher forceps. With these forceps used as tractors the lower flap is undermined toward the apex of the gland with Device's long disserting scissors. The Kocher forceps are removed after being touched with the disthermy needle. The upper flap retracts because of the pull of the severed pubovesical muscles. The anterior and much of the lateral aspects of the false capsule now being ex posed an inverted V incluon is carried down to the adenoma, which is readily recognized by its typical whitish appearance. The \ shaped flap is elevated which opens up a lozenge shaped space. With the doord curved dissecting scissors the lower margins of the lateral lobes are freed from the false capacie. The dissection may be continued with the scissors, or, as the author prefers, with the finger For this purpose it is best to remove the retractor temporarily. The lateral lobes and when present, the middle lobe, are freed digitally from below upward until they present in the wound, being attached solely in the region of the bladder neck. The pedicle is seized on each side with Kocher forceps and the adenomators man is detached with scissors or the disthermy needle. The forceps are touched with the disthermy needle and removed. In 1 instance only has a steadying firger

in the rectum been necessary. The retractor is now replaced the field swibed and sucked dry and the edges of the false capsals are secured with a pairs of Alis Jorceps. By traction on these and suitable manipulation of the fernile lamp and sucker the prostatic bed is carefully inspected. The two prostatic settines, if not shready secured in the pedicle, are easily seen bleeding close to the bladder neck at 5 and 7 o chock. They are selected with hemostars and coagnitized Any other obvious bleeding vessels are similarly treated. This are present on the contract of the

Bleeding having been controlled, the towel correing the penis is then raised and a No. 18 Harris catheter passed along the urethra into the protection of the penish and thence guided into the bladder With the assistant steadying the Allis forces on the margins of the false capsule, the operator closes the defect with a continuous source of No. o catert, using the boomerang needle. The transverse facision

in the true capsule is then approximated over this with a or more interrupted No o catgut sutures All obvious bleeding should now have been controlled The lateral recess packs are removed the field is cently swabbed dry of clot and sprayed with sulfanilamide powder and a small corrugated drain is placed down to the suture line. The self retaining retractor is removed and the rectus sheath closed with interrupted No. 2 catgut sutures. The skin is closed with allkworm gut Bilateral vasectomy is then performed. The catheter is next prigated with 1/5000 flavine to free it from any clot it may have collected during its passage through the prostatic bed. Four ounces of fluid are left in the bladder and the eatheter is spigoted. Two silkworm sutures fix the eatheter to the skin of the penns A 4 foot length of sterile tubing with a glass connection of even bore is then attached to the catheter, the lower end of the tubing being spigoted. The operation time need not exceed half an hour and is often nearer 20 minutes.

IOHN A. LORE M.D

#### MISCELLANEOUS

Cordonnier J J: Vesicoureteral Reflux Accompanied by Renal Colic. J Am M Ass., 1945

The role of vericoureteral reflux in the production of renal cohe was brought to our attention by Lewis and Caroll in 1934 all cases described by them were secondary to vesical neck or urethral obstruction, and the typical renal colic occurred in the presence of a distended bladder when the patient attempted to void.

Diagnosis is established by filling the bladder with an opaque solution, taking an x ray film, having the patient void, and then taking a second film

The etiological factors are (1) mechanical obstruction of the vesual neck with upward dilatation and alterations of the uncteral orifice due to chemcal, inflammatory and postoperative changes (2) patent untersal orifices associated with nerve knows as in cauda equina lesions and (3) congenital untithal valves

Two cases with typical renal colic caused by

rescoureteral reflux are presented

I caicountieral reflux should be suspected in cases of read codic, particularly if no stone in demonstrable and venual neck obstruction is present. Postopers the untercoversical valve cleatrices may be followed by vestoounteral reflux. A routine cystogram alone may cause a reflux to be overlooked, and a second film, taken after the patient has voided should be taken.

DAWD ROUSENDOOM M.D.

Marshall C. J : Tubercle Bacilluris. Bril J. Urd., 1945, 17 tos

While a series of II cases is much too small for statistical analyses it may however bring out a few points of particular interest.

The presenting symptoms of these cases of tuber de bacillura were the classic triad found in urinary tuberculosis but in addition the importance of the node in the epididymus was fully borne out. Whether every case of chronic epididymus is should be subjected to full urinary investigation remains for discussion it would seem however that there is one unequivocal indication—the examination of the twenty-four hour specumen for cells and bacilli. This simple but nevertheless searching test should never be omitted. Open tuberculosis cannot fail to make itself evident at least by the presence of leucocytes, if not of bacilli, the presence of either or both, of course, calls for the full reentgenographic investiga too, with cystoscopy.

There remains the case of closed tuberculosis in which cells are not found in the twenty-four hour specimen such cases must be uncommon but never theless they are on record. Such cases will be mused unless excretory roentgenography at least is per formed.

The overwhelmingly important question however is that of treatment. In view of the evidence that small lesions do heal, even with calcification, it seems that there is strong justification for a policy of conservatam. Unnary tuberculosis is not a ful minating conduition on the whole it is only slowly progressive and further vesical lesions, in general, present a high degree of recovery once the renal disease is removed. The progress of the condition lends uself to very precise observation again, repeated examinations of the twenty four hour specimen provide clear indications for repetition of the cystoscopic and reentgenographic investigations

Therefore it seems that if conditions in general are favorable and the patient is co-operative in the mat ter, so-called expectant treatment is permissible. Only one further point is to be emphasized that is, how permanent is the healing of renal tuberculous? It will be noted that even in this small series there were cases in which healing occurred only to break down later on, and it was common experience in nephrectomy for gross tuberculous to find areas of calcification indicating healing in the remote past, with recurrence of extensive destruction. It may nevertheless still be argued that in view of these considerations-ease of control and slowness of prog ress-the tendency to later breakdown still does not invalidate the soundness of the conservative attitude m simple bacilluria. There was little support for it in the cases presented Gross tuberculosis was found in each one submitted to nephrectomy and in 3 the old healing had broken down again of the conser vatively treated cases 1 developed gross renal tuber culosis and in the others tubercle bacilli were still present in the urine.

JOHN A. LOUT M.D.

Ward, R. O : Some Surgical Aspects of Urinary Bilharziasis. Prec R. Soc M Lond. 1945 39 27

Bilharsiasis is a disease which produces many important changes in the urinary tract and is if only for that reason worthy of the interest of urologists. Examination of the wrise. The most general method of making a disposis of bilharrians hema tobia is to examine the last drops of urine passed or the centrifuged deposit of the urine of the patient under a ½ inch or ½ inch objective. No staining is required The own with their terminal spines are easily recognized. In the late stages the sclerozed bladder may be palpable in an emacusted patient, and per rectum extensive induration may be found to involve the prostate and vesicles and all tissues at the bladder base and in the perform

The importance of cystoscopy in diagnosis (1) A solitary examination of the urine for ove is a quite unreliable test, for ove are not continually released from the lesions of the mucosa. (2) Five consecutive morning specimens, the last few drops of the prine being collected and centrifuged will show either ove or red blood cells in about 85 per cent of the cases the latter being strong evidence in the mass examination of natives that bilharria is present. (3) Even in the absence of ova or red blood cells the continual presence of pus or albumin in a native s urine means that a diagnosis of bilharma is probable until it has been disproved. (4) Cystoscopy is the most accurate method of diagnosis in all active phases of bilharmasis. Moreover there are several characteristic vesical changes which pensist when the active stages of the disease are past. It may be argued that cystoscopy does not reveal lesions of the kidneys and the urethral mucosa that must be admitted but it is probably very rarely that these timues are affected without vesical involvement.

Cytloscopic oppearances in remail billioristaris. The earliest abnormality seen in the bladder mu coas is the appearance of patches of congestion which occur most commonly in the trigonal region these, however have no characteristics which enable a certain diagnosis to be made. Subsequent stages are specific.

The first of these stages is very typical. Bilharrial tubercles make their appearance. Each of these is about as large us the tubercle due to Koch a bacillus (to which it bears some resemblance) that is to say about the size of a pin a head. It is raised above the level of the mucosa and is surrounded by a narrow ring of congested vessels. It has a shining surface and a faintly yellow color As it grows and dies the shine diminishes, and the yellow color remains and is sometimes intensified while the surrounding hyperemia becomes less or may disappear entirely The bladder mucosa which lies around a collection of these tubercles is sometimes congested but it may be very little different from the normal. When an intense invasion by ova is in progress very marked bullous edema is often produced. It is difficult to say how much of this is a mere reaction to the ova and their toxins, and how much of it is due to venous blockage by the worms, but probably the former is

the more important cause.

Calcification of the bladder tissues around the ova is a prominent feature in all severely infected long standing and untreated cases.

One local result of calcification is what is called sandy patches in the mucosa.

The process of calcification afferts chiefly the submuccorn layer of the bladder wall. It is by no mean necessarily accompanied by secondary infection, and on cystoscopy in such cases the bladder has often been clean. When this was the case it was usually very pale because of scierosis and diminustion of the vessets. This calcification forms a barrier in which many ova perish and through which others cannot work their way.

Another stage is the divisionment of a billurial uker. This may be clean and without dough, if it usually single and Maker says that he has never seen this type of their become malignant. More often secondary infection is coexistent, and in such cases an uker also usually a solitary one, has a slouthing hase and marked cystifts is present.

Vesical papillomas due to bilharria are common in This is a true neoplastic condition and Egypt frequently malignant. In that country cancer of other organs is uncommon, and these growths are considered to be the result of the toxins of the ova. A bilharxial papilloma unlike a granulomatous mass with which it sometimes may be confined by of course, not to be cured by medical treatment. These growths do not have long fronds but are of firm consistency Usually there are only 2 or 3 of them. The commonest variety of bilhardal papilloms met with in Egypt is of bulbar form and dark red color although in parts it has a grayish white appearance due to septic necrosis and to phosphatic deposits in the growth. These growths may spread and in rare cases involve the greater part of the bladder Nodular infiltrating carcinomas are less common. In the series of 130 cases, 10 were of this variety. This variety has the characteristics with which we are familiar and follows the course com mon to all bladder carcinomas of this type.

In untreated cases the musculature of the bladder which is the seat of this disease, tends to be thick ened partly because of hypertrophy and partly because of fibrosis due to the additional development of prostatic and urethral obstruction, remiting from bilharzial changes in those tissues. Despite such obstruction the bladder in these cases often remains contracted and this renders suprapuble cystotomy very difficult or impossible. Urinary fistulas which are a direct result of the disease produce the same result. They affect all parts, but particularly the floor of the urethral bulb and are often so numerous and extensive that when the male patient squats to micturate the perincal effect resembles the spraying from the rose of a watering can. These fistules sometimes track widely

Vesical calculi are met with in bihardissis and in rare cases the owa have been found within the stone. These calculi appear to be composed of unic acid and oxalates, and are formed upon definis. Prosphatic calculi are very common when sepais has become severe. Renal calculi are also encountered, although they are very much less frequent.

Ureteral obstruction of moderate degree is often encountered during the active stage of the disease In such cases it will disappear when a course of treatment with antimony has had time to kill the worms and thus cause the acute reactive processes to resolve

Chronic areteral stricture is a very important and frequently insidious result of bilharziasis which we must be prepared to diagnose and to treat affects the lower parts of the duct for the upper portions lie in an area which is but rarely invaded by the worms. Most of the various pathological conditions which arise in the vesical mucosa may also be encountered in the ureters, but stenosis is the common complication Although it may sink into relative insignificance in the clinical picture of a native affected by advanced urinary bilharmasis, yet in such patients death from infected bilateral hydronephrosis is common. These strictures how ever are encountered in patients who appear at first sight to have recovered completely from the

Dilatation of an established stricture of the weter is best effected through an instrument of the McCarthy panendoscope type with some form of still ureteral dilator. Such a method when possible is very effective more so it seems than in any other types of preteral strictures and although the case requires further supervision the cure is often complete.

The author does not discuss the general treatment of urinary bilharziasis or of the later complications of the disease.

Tartar emetic remains the best drug for treat ment, despite some unpleasant effects experienced by the patient during the period of administration. The course should amount to a total of 30 gr and it must be intensive lest the parasites acquire a resistance to antimony There are also some more recent prep arations such as stibophenum anthiomaline and louadin. These are administered intramuscularly this is of great value in the treatment of the school children of the Delta. These preparations obviously have advantages when large numbers of troops are treated but they are not considered to be so cer tainly curative as is antimony sodium tartrate Antimony first sterilizes the generative apparatus of the female worms and ultimately destroys them It is not known just how certain is the effect upon those ova which have been deposited before treatment was begun.

It will be agreed that we must keep our eyes open for occasional cases of this disease. Not only officers but men of all three Services have been in the countries where this disease is endemic.

TORN A. LOXY M D

Combes, F C. Canizares, O and Landy, 8.: Lymphogranuloma Veneroum. Am J Syst.,

The problem of diagnosis of so-called latent forms of lymphogranuloms venereum has never been solved and this inability to determine the presence or absence, or the degree of activity of the disease is a serious handicap Patients considered cured discharged, and allowed to resume their normal activities frequently have a residual, small hard mass in the inguinal region which has been interpreted as a fibrotic reaction and a sequela of the reparative process but there is no proof at present that these patients are definitely cured and that they do not harbor dormant but viable virus in these nodes. The same problem exists in patients with anogenitorectal involvement. A test capable of detecting evidence of activity during these latent" periods should be invaluable. The Frei reaction persists after con valescence for an indefinite time, and is not an indi cation of the degree of activity. The complement fixation test of Grace Shaffer and Rake is not yet standardized and perfected

There are definite changes in the blood serum proteins of patients with lymphogranuloms venereum, chief of which is a hyperglobulinemia. The formol gel test is predicated upon the presence of an increase in seroglobulins, and is not specific for any disease A rapidly positive formol-gel test indicates a high seroglobulin The authors made formol-gel tests and albumin-globulin ratio determinations on 42 cases of lymphogranuloms venereum and formol-gel tests on 307 controls. Of the 42 known cases of lymphogranuloms venereum, 38 had positive formol-gel reactions after the disease had been present for three weeks and these were consistently positive after the disease had been present for several months or years especially in active anorectal cases. Of the 307 controls only 6 gave positive reactions. The authors conclude that the formol-gel test is a simple reliable bedside procedure of value to determine the presence of hyperglobulinemia in lymphogranuloma venereum There was a tendency toward a return to normal after a clinical cure in 85 per cent of the cases. Hyperglobulinemia is of some value in determining the degree of activity of lymphogranuloms vener eum and formol-gel reactions and albumin globulin ratios should be determined in all patients as an aid in treatment and for indication of biological cure DAVID ROSENBLOOM M.D.

Magnuson, H J., and Eagle, H.: The Retardation and Suppression of Experimental Early Syph Ills by Small Doses of Penicillin Comparable to Those Used in the Treatment of Gonorrhea.

Am J Syph. 1945 29 587

The widespread use of penicillin in the treatment of gonorrhea has raised several problems with respect to the effect of such therapy on concomitantly ac quired syphilis. Since the doses of penicillin usually employed (100,000 to 200 000 units) are sufficient to cause the disappearance of treponema pullidum from primary lesions which were previously dark field positive and since these doses are subcurative for established syphilis in man it is conceivable that such therapy given during the incubation period of syphilis might (a) prolong the incubation period

(b) suppress the symptoms and result in an asymptomatic infection, or (c) actually abort the syphilis A number of cases have been reported in which peal cillis therapy for gonorines has rendered the dilag nosts of syphilis difficult either by making a presisting but unrecognized primary lesion darkheld negative or by delaying the appearance of symptomatic or serologic cridence of the disease.

The authors demonstrated that, in rabbits amell doses of penicillin have definite suppressive effects on the development of the lesions of early syphilis. The smaller the spirochetal inoculum the more pronounced is the suppressive action of penicillin and the suppressive action is maximal when the penicillin is given before the seventh day of the illness When penicillin falls to prevent the appearance of the primary lesion, it regularly causes a algoificant prolongation of the incubation period probably because most of the organisms have been killed by the penicillin and the few residual organisms take more time to develop a primary lesion. In some cases the primary lesion and the infection were aborted In general, the smaller the inoculum and the earlier treatment was begun the greater was the proportion of inoculated sites at which lesions failed to develop

Clinically doses of penseilin comparable to those used in the treatment of gonorrhes may materially modify the course of syphilia simultaneously acquired in many of the cases the incubation period is merely prolonged and the patient may no longer be under medical supervision at the time of development of the lesion. Patients treated for gonorrhes with peniellin should be followed up both clinically and seriologically for a minimum period of 4 months after exposure in order to minimize the possibility of delayed primary lesions or clinically "asymptomatic syphilitic infections, and the patients should be specifically advised of this danger.

DAVID ROSIDIBLOOM, M.D.

Joshi, L. B.: Urinary Calcult Ind J Surg 1945

The author's article may be summarized as follows

i The uriniferous tubule probably acts on the

- principle of a flush.

  a All deposits in the kidney which are insoluble plaments, and casts could be seeds of urinary stones.

  3 Sodium chlorides and sulfates have the
  - property of preventing the formation of urinary stones.

    4. The tertiary rock map of the world in associa thon with the big rivers resembles the map of distri-
- button of urnary stones.

  The scarcity or abundance of water has no
- of the scarcity of abundance of water has no effect on the incidence of urinary stones.

  6. The temporary hardness of water is one of the
- most important causes of urinary stones
  7 The envelope shaped crystals seen in oxaluria
  are composed of potassium oxalate and not of cal
  cium oxalate.

- In cases of phosphaturia, gaatric analysis often reveals achlorhydria or hypochlorhydria.
   Calcium sulfate is a fairly common con-
- atituent of urinary stones.

  10. The age incidence of urinary stones probably
- depends on the general standard of health and care of children.

  11 Town people acquire more urinary stores
- (than the rural population) if the water is not chlorinated or filtered.
- 12 Whales sailors of old days, and long term jail inmates have no urinary stones

JOHN A. LOEP M.D.

Wilson, J. G. Benjamin, J. A. and Leaby, A. D.: Study of Experimental Urinary Calculi, Methods for Producing and Preventing Calculom Formation in the Bladder and Uratina of Albho Ratt. J. Ural. Ralt., 1945, 34 59.
Newborn albino rats were injected thrice weekly

with 0 : magm, of estradiol diproporionate for a period from a to A, weeks as that the total desage was either 0 6 or x s mgm. Seventy-eight injected admais were fed on a commercially prepared stock ration which did not vary much from other such preparations, all of which are of a high maneral content. Thirty-four animals were fed on a low mineral duct which was of smiticent amount to be compatible with normal growth and reproduction. Beginning at yo days of age periodic examinations by palpation of the bladder and the urethra, and by x ray were made to detect the presence of stocs. Urinary infection was ascertained by culture and by the ability of the organisms to split tera. The urine

9.11 was determined on each specimen. Forty five animals were fed on a high raisent diet until the presence of stones was ascertained, death ensued, or until 7.5 months of age was reached. In this group there were 30 male animals, 24 (83.6%) of which developed vertical or urether clearly between the first and the different months, and during this period zone of the females or control animals depended zone of the females or control animals de-

veloped stones. In order to determine the accuracy of x ray and palpation as a method of demonstrating unnary calcult 23 male and 12 female animals were fed high mineral diets after wearing and were sacrificed at intervals for autopsy. The results confirmed the opinion that the stones began to form somer than they could be detected by means other than antopay The authors state that if all the males had been per mitted to live to the age of 110 days, it may be estimated that at least 10 (47 6%) would have yielded stones at autopsy as contrasted with so. per cent of known cases of lithiasis at this age in the previous group of male animals. Also I female in the autopsied series was found to have stones in the bladder There was no difference in the incidence of stones in the group receiving 0,6 or 1 2 mgm. of

estradiol diprogionate.

Cultures of bladder urine of injected males
showed infection whether or not calcull had formed.

Specimens from 13 older maies yielded escherichia coll in 10 and the remaining 3 showed a nonhemolytic streptococcus alpha hemolytic streptococcus and a mixed streptococcus feeding and contraction existed between the infectious agent and the age at which the host formed calculated the remaining of the same showing calculi was always more or less alkaline. Urmary infection always preceded calculus formation

Seventeen of the 24 males with infection showed focal attes of infection in the bulbourethred gland and occasionally in the prostate seminal vesicles or bladder wall but rarely in the kidney. In the injected females 9 of the 20 had infected bladder urne, but it is of particular interest that at necropsy not a angle matance of local infection was found in the urnary tract. Focal infections were observed in the attophen uteri and oviducts in 8 of 28 cases but were not always associated with infection in the urine.

All stone bearing males revealed some unnary tract abnormality with a variable resultant stass. The most perastent finding was obstruction between the bladder and urethral sinus which seemed occasioned by the common finding of an abscessed bulbourethral gland. Then too the sectioned bulbourethral gland. Then too the sectioned urethra at this point of several young estrogen injected rats revealed great numbers of desquamated comified cells, often in the form of large plaques suspended in the lumen. No urinary obstruction was found in the female animals except in the one which developed a stone

Nineteen males and 15 females were injected during the first a weeks of life. They were fed a low mineral diet and secrificed after a period of 180 days. Two males in this group revealed calculi the other animals were free of atones. The atone incidence in this group was reduced from 81.8 per cent to 10 5 per cent by feeding a group of injected animals on a low mineral diet.

The authors concluded from their experimental work, that (i) infection preceded stone formation (c) alkalunura was characteristic of stone forming animals (3) neither the type of organism nor its urea splitting potentialities was related to the urine H or calculus formation (4) urinary stasis accompanied calculus formation but was not necessarily responsible, and (5) lithiasis so produced could be materially reduced by a diminished mineral dict.

ROSERT LEM, JE., M.D.

Benjamin J. A. Wilson J. G., and Leahy A. D.: Study of Experimental Urinary Calculi; Quantitative Microchemical Spectrographic, and Citric Acid Analyses of Albino Rat Calculi, with a Preliminary Apatite Report. J. Ural. Balt., 1015 62, 516.

The stones analyzed in this paper were produced experimentally in rats by feeding them on a high mineral diet and subjecting them simultaneously to injections of estradiol dipropionate. The calcult varied in size from x to 6 mm.

Ninety per cent of the stones showed a composition of magnesium ammonla, phosphate, and moisture Calcium was found in small amounts as was citrate and carbonate in only minute amounts. These results were confirmed by spectrographic analyses. It was found that carbonate-apatite was a common constituent of the stones studied

The principal chemical constituents in this series of calculi were reasonably constant, tirrespective of the size shape, or site of origin. Bladder calculi as compared to urethral calculi were white in color rather than brown but in both, magnesium am monium phosphate hexahydrate was the principal compound, though the urethral calculi contained calculm and more phosphate.

Spectrographic studies confirmed the findings, and occasionally revealed small amounts of sodium iron aluminum and allicon Rosert Lich Ja M.D.

# SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Jönsson, G i Haa Acute Hematogenous Osteomyslitis Become Less Common and Less Severs? Acts chir send 1945 92 533.

The author has gone through the material of 30 years (1913-1941) of hematogenous exteomycilitis seen at the Surgical Clinic in Lund. This followed a suggestion made during the last decade that acute hematogenous osteomyelius has changed in character in that it has become less severe with the years and at the same time a disease that occurs less and less frequently

The material consists of 135 cases. Its distribution regarding sex and age corresponds to the figure usually given. If the cases are divided into 5 year periods one finds that the smallest number has been treated during the last period during which no death occurred. The study reveals that a smaller number of complications have occurred during the last 5 year period as compared with entire ones. The duration of treatment has been considerably shorter during later years. During recent years the patients condition on admittance to the clinic has been much better than formerly. In ocarly all of the cases the treatment has been operative. Serum or chemotherapy has not been employed in any of the cases.

The Lund material gives one the very definite impression that the disease has had a considerably more benign course during later years than previously, with fewer deaths during the septic initial stage fewer complications during the later stages,

and a more rapid course of healing

Buchman, J., and Biair J E.: Penkellin in the Treatment of Chronic Outcompelitie. A Preliminary Report. Arch Surg. 1945. 5

The authors conducted a clinical and becternlog ical study of the results of treatment of chronic ostcomyellus with penicilin, with and without surgical intervention. There were 68 lesions in 47 natients.

Some of the conclusions drawn are tentative be cause of an insufficient period of follow-up but others are sufficiently clear and certain

The use of penicillin alone, whether given by local application or intramuscular infection, is totally in effective in chronic outcomyclitis. If after preoperative and postoperative administration of penicillin and thorough saucertration the resultant wound is allowed to beat by granulatoo the results are not materially inducenced by the addition of penicillin to the treatment. The same type of treatment and delayed primary closure (rather than allowing heating by granulation) constitute a considerable improvement over previous methods. The treatment of chronic acteomyclitis by preoperative and post of chronic acteomyclitis by preoperative and post

operative administration of penicillin, thorough saucerization of the focus of infection and pumary closure of the resultant wound gave entraonlinearly good results in 23 of 27 patients, but the arthon state that the postoperative period of observation was insufficient

Of the tuberculous lesions of the bones and joint secondarily infected with congolose positive study lococcus surveus, treated by the properative and postoperature administration of penicillin, and subjected to thorough succertation and primary desure a limited number presented primary besling over a short period of observation

A distinct advantage of primary closure is the reduction in the incidence of secondary infection which so frequently (80%) complicates delayed closure. Staphylococci pernisting in wounds being by granulation or delayed closure develop increasing resistance to penicillin.

DOREL II LEVENTIAL M.D.

Alterneler W. A., and Reineke H. G.: Roentgenegraphic Interpretation of Acute Hermatogenous Outcompelitis Treated with Penkillin. 4st J. Reesig 945 54 437

The Introduction of penicillin has completed altered the management of acute hemotopeous osteonwebits. The rapid control of the general acol local infection makes as emergency surpeal deconpression of the area of the bone involved unaccessary countries as a rule, is functed to inclosure and drainage of abscenses of the soft theore and or moved deconpression of the soft theore and or removal discussions of the soft theorem and to removal discussions. Because of this milder course the bootenages which follow above a different appearance from that which is known to characterus the seasurement and the second of the countries of the soft the soft of the soft the soft of the soft of the soft of the soft the soft of the sof

During the past 37 months the authors observed 52 cases of acrote bematogenous estempedial treated with pendellin. In 44 of these the osternychitis was localized to the long boors, in 44 of the ethodogous agent was represented by the bemolying staphylococcus aureus in 32 cases, the nonhemolytic staphylococcus aureus in 32 cases, the nonhemolytic staphylococcus aureus in 35 cases, the hombotic streptococcus in case the pneumococcus III in 1 and 18 remained undetermined the 4 cases.

All of the cases were treated with pencilla, at though in 38 limited amount of aditionamiles are given prior to the pencilla. The early case reci ved less than Aco oco units of pencilla, but centually a total of 1 sococo units remainly venously or intramucularly at the rate of from 15,000 to 15,000 units every 3 bours proved the most desirable dosage. In some cases it was administered by intra remousl drip at the rate of from ministered by intra remousl drip at the rate of from

as to 30 drops per minute in the form of 2 000 c.c. of physiological anime solution containing 30 000 to 80,000 units of penicillin. The dose was reduced when it became apparent that the infection was controlled.

The results were remarkable. All patients recovered except 1 so that the mortality was only 1 o per cent. The period of morbidity likewise was

strikingly reduced

Clinically the cases were divided into four groups Group 1 The correct diagnosis was made within the first 2 or 3 days and adequate treatment started

immediately The results were truly excellent Group 2 The diagnosis and treatment were moderately delayed Here the infection was brought under control in 2 3 or more days and local soft tissue abscesses developed more fre

Group 3 The diagnosis and treatment were de layed for from 7 to 10 or more days when the infection was unusually severe, local destruction of bone became very great, and soft tissue abscess formation and sequestration occurred in most cases In this group the infection was arrested with more difficulty and rather prolonged treatments were necessary Small abscesses were treated by aspiration, large ones by incision and drainage and the sequestra were removed

Group 4 The esteemyelitis was so fulminating that surgical intervention still constituted an emer gency measure. In such instances penicillin at the rate of 15 000 units every 1 to 3 hours was given

preoperatively and postoperatively

The roentgen changes in the various groups were

interpreted as follows

In group r the bone alterations were minimal consisting of areas of localized periosteal reaction small areas of patchy decalcification of the under lying cortex, little or no evidence of sequestration and ultimate reconstitution of the bone. In 3 cases

the roentgen findings were entirely negative In group 2 the changes likewise were minimal at the beginning of the treatment, but after a week or

so periosteal reaction and patchy demineralization of the underlying cortex became evident. These in creased in extent and degree, becoming most marked in from 1 to 5 months after the onset of the infection Then, recalcification followed with rapid return to normal. Sequestration occurred only occasionally In group 3 there was extensive bone destruction at the start of the penicillin therapy This increased on subsequent examinations Small sequestra were absorbed spontaneously and larger ones acted as autogenous grafts. Rarely was the sequestrum discharged. Recovery followed eventually

In group 4 the bone destruction was very exten

sive due to the severity of the infection

The authors include detailed clinical histories of 6 typical cases and use serial roentgenograms to illustrate the course of the disease under the in fluence of the penicillin therapy and the good re sults obtained T LECCUTA, M.D.

Lewis R. W : Differential Diagnosis of Tuberculosis in Joints of the Extremitles. Am J Rossig 1945 54 329

In 1924 Phemister described the principal enteria of differential diagnosis between tuberculous and nontuberculous suppurative arthritis. These cri terra still stand although they are not as widely employed as their importance warrants. Therefore, the author wishes to restate them and add some new ones of his own

According to Phemister in pyogenic arthritis there is early narrowing or disappearance of the joint space because of the fact that the articular cartilage is killed and broken down first at the points of contact and pressure of the opposing articular surfaces For the same reason the earliest bone destruction occurs in the opposing or weight bearing portions of the articular surfaces. In contrast to this in tuberculous arthritis the joint space is preserved for months or years since the earliest destruction is peripheral along the surfaces where tuberculous granulations can grow Likewise the earliest bone destruction is not on the contiguous opposing bony surfaces but about the margin of the weight bearing surfaces.

To these points the author adds (1) in acute pyogenic arthritis osteoporosis about the foint is rapid and marked whereas in tuberculous it is usually lacking (2) acute pyogenic foints show a distinct tendency toward repair and ankylous features which are customarily absent in tuberculosis and (1) in tuberculosis the adjacent muscles often are markedly atrophic which is not the case in acute

nvogenic infections

Unfortunately however the picture is not always so clear. There are many variables due to difference in virulence of the invading organisms and reaction in the host. Another confusing factor is the apparent difference in the roentgen manifestations of certain joints as for example the hip joint, in which the criteria of Phemister are seldom observed and therefore the differential diagnosis must be more circumspect. Still another difficulty is created by the rather infrequent but enturely different form of tuberculous the so-called caries sicca.

The differential diagnosis of tuberculosis of loints from other diseases than acute pyogenic infection as a rule, is quite easy aithough lymphatic leucemia and probably some other conditions may simulate

tuberculous arthritis.

Several illustrative cases are presented to prove the various points. T LEUCOTIA, M.D.

Simon H E: Muscle Hernia, with Report of 6 Additional Cases in the Arm and Leg. Mil. Sur PLON 1045 97 369.

Muscle hernus or protrusion of muscle tissue through a defect in the overlying fascia is rarely recognized in civilian life. In military service, it is frequently observed and often symptomatic. The author presents 6 case reports to add to the 163 cases of muscle hernia described in the literature. Three of the patients developed the hernias in the Laire of the patients unvested the nermas in the lower extremittee and 3 in the upper. The condition somer extremutes and 3 in the upper 1 in condition occurs almost invariably in the third and fourth occurs almost invariably in the third and fourth of the state occurs samos invarianty in the title and decades and is practically limited to males.

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oue to a single powerful nuscie acress. Due The whopsthis or spoulaneous type. Crease in muscular development and activity The enterior tibial muscle is the one usually ane anterior tions make it into one trousing involved although berna may appear anywhere It appears as a circumscribed seminicularity avening the position of the position values in size according to the position of the plant values in size according to the position of the plant values are according to the position of the plant value and an according to the plant value and according to the position of the plant value and according to the position of the plant value and according to the position of the plant value and according to the position of the plant value and according to the position of the position where warres in size according to the position of the part involved and the state of contraction of the underlying muscle. Typically the swelling in underlying muscle. Typically the swelling in all the with more in place and is reduced. underlying muscle Typichily the swelling in creases in size with muscle relaxation and is reduced.

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uses are started text, then other exercises are earned out with the failest on his face until the further

stiffness is overcome. After the patients are up a light brace is fitted in group a and a light plaster jacket in group b which may be worn from 6 to 12 months or longer

The results are encouraging In group a the pa tients have remained well for as long as 7 years. In group b relief of pain and general improvement are often obtained for varying periods. Even in group csome relief of pain and unless the spine is completely ankylosed a partial correction of the deformity is

Johnson of the Charterhouse Rheumatism Clinic in his part of the symposium pays special attention to the prognosis of spondylitis in relation to treat ment. He takes exception to the very gloom; view as expressed in Volume 2 of the British Encyclopedia of Medical Practice (1936) The books of the Char terhouse Rheumatism Clinic contain reference to some 500 spondylitis patients. A review of these records reveals an entirely different aspect.

The disease is almost certainly an infection pos sibly due to a form of tubercle, although some regard it as a disease of the endocrine system. In many instances breakdown of the natural resistance seems to be determined by physical overstrain or by an accident. In the untreated case the prognosis de pends on this breaking down of the natural resistance.

Some years before his death Scott introduced the wide field method at this institution for the x ray treatment of ankylosing spondylitis. The principle behind this method was to stimulate the natural re sistance. The results were so satisfactory that the method is being continued An average dose of 50 roentgens twice a week is given but in some cases it is reduced to 10 roentgens to avoid all possible un pleasant reaction. Hemoglobin estimation and special sedimentation tests are often necessary guides. The total dosage in 1 year is not allowed to exceed 1 500 roentgens

If x-ray treatment cannot be given stock vaccines of streptococci and staphylococci given weekly are often a good substitute Other forms of stimulus, such as cold or even ultraviolet ray baths, may be of value. Potential foci of infection should be removed

Under such care the prognosis as regards the con tinned capacity to earn a flying is good Nearly all patients of the Clinic are able to hold down ordinary lobs. Neither are they dissuaded from marriage. There is no proof that the disease is hereditary T LEUCUTIA, M.D.

Hooker D II : Brachymetopody Bull Johns Hopkins Hesp., 1945 77 329

Brachymetopody is a condition in which certain digits of the hand or foot are shorter than normal. It is caused by abnormally short metacarpals or metatarnals, respectively Three cases are presented in which there were short fourth toes.

The chief complaints were metatarsalgue, callosthe over the metatarsal heads and relaxed longi todinal arches. The condition apparently was present at birth. All of these patients began having



Fig. 1 Shortening of otherwise normal fourth metatarsal bones, each metatarnal being about 13 cm shorter than the adjacent third metatarnal.

trouble with their feet after basic training in the

A hereditary factor was established in every one of these cases. The treatment consisted of arch supports, metatarsal pads, weight reduction and lumited physical activity

A congenital origin of brachymetopody is sug gested by the author GRORGE L REIM, M.D.

### SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Knight, M P., and Wood G O : Surgical Oblitera tion of Bone Cavities following Traumatic Os teomyelitis. J Bone Surg., 1945 27 547

High velocity war missiles have not only contributed many cases of osteomyelitis of the long bones but have furnished the orthopedic surgeon with many massive soft tissue and bone defects. Since skin and muscle defects over the long bones un equivocally interfere with bony repair the authors have devised a new approach for the expeditious obliteration of such cavities. It is apparent that if let alone, these defects would prolong rehabilitation and increase morbidity To expect bone growth to ensue in the presence of infection granulation, or even scar tustue, is indeed a bizarre expectation. Furthermore, bone does not show any demonstrable evidence of regeneration beneath adherent aplit thickness grafts as the cavities remain essentially the same size for an indefinite period of time, Previous efforts to obliterate septic cavities by anti septic paste fat muscles and pedicle grafts have also proved unsuccessful.

The authors present a small series of 23 cases which were operated upon in three stages (i) thor ough sequestrectomy and excision of scar (s) early split skin grafting and (3) bone grafting followed by immediate application of a full thickness pedicled graft.

The first stage is that of acquestrectomy and prep-326 aration of the cavity All cicatnical soft tissue must be excised Eburnated bone or cartilage if the de fect is near a Joint must be saucenzed in its entirety The wound is then packed with vascline gauxe and the limb is encased in a cast. At the end of 5 days the wound is inspected and if an exuberant grand lation is noted on the bony cavity a split grafting operation is done to convert the compound wound

The second stage comprises the application of a into a closed one. split thickness skin grait The recipient area is curetted of any nonviable or granulation tissue, and a split thickness graft from oro to or6 of an inch is obtained and placed over the defect. A pressure dressing (Koch's) is applied on the wound Immobil hration is effected by a spilnt or cast. Chemotherapy counsting of penicillin or sulfonsmides is administered for 3 days. Under this regime from 80 to 95

per cent skin take has been observed The third stage consusts of obliteration of the bone cavity with sutogenous bone chips. The principal

I Planning of a suitable full thickness covering factors of this stage are

a Complete excision of the split throkness cover ing from the depth of the saucerised bone defect for the defect 3 Procurement of sufficient bone chips from the illac crest or other suitable sites to fill the cavity

4. Covering of the chip filled cavity with skin and auboutaneous these without skin tension and placing completely

onteogenic consolidation of the defect can be the suture line on sound bone. further enhanced by curetting the cavity and opening both ends of the medullary canals. A pressure dressing of machinist's waste is again applied sutures are removed in 6 days chemotherapy is continued for from 3 to 5 days, and immobilization is main-tained until bony union is obtained.

Accompanying the article are many excellent photographs of the technique and numerous roent processing of the technique and numerous rocat

The complications encountered in the 25 cases were hematoms in 2 tibles, suppuration in 1 tibis, and femura and a draining sinus adjacent to the operative site In a femur

Gillis, L. Nearthrosis of Humarus Shaft for Ampu tation at the Elbow Brit. If J 1945 2 686.

The author describes a new operation for making a joint in the shaft of the humerus for cases of am nutation at or near the elbow joint. According to this article it is no longer necessary to amputate an arm at the orthodox site of election, i.e. 7 or 8 inches below the tip of the acromium. It is to be remem bered that the forearm resected at, above, or below the elbow joint can now be fitted with a useful

As its purpose the operation is designed to ac complish two distinct functions (1) to conserve the prosthesis.

muscular power of the flexors and extensors of the forearm and to harness that function and (2) to make a new joint in the shaft of the humerus at least 4 in. below the shoulder which should possess the property of complete extension and a varying degree of flexion.

The author has performed 24 such operations. The first 8 of these necessitated a second inter vention for removal of increasing ankylotic bone callus in order that bony union of the new joint be prevented The technique was altered as follows I A posterior muscle splitting incision from a to 314 inches long was used

2 From 11/4 to 2 inches of the humeral shalt were removed with a gight saw

The ends of the bones were bevelled at an angle of 45 degrees in front to permit the manmum degree of flexion

4. The medullary cavity of the bones was curet ted and packed with bone wax.

The bone ends were fulgurated and sulfanis mide implanted in them. This step is considered important by the author as it vitlates ostrogene-

The postoperative management comusts of the application of a straight plaster of Pers cast for 3 weeks, active and passive motion of the new forearm, and the application of a figure 8 crepe

In addition to several illustrations, the article contains 5 detailed case reports depicting the technical perplexities encountered in the original opera tions and their solutions.

The results in 10 cases show uniform function of flexion and ability of the patient to touch his face and back of the neck without pain. Six of the st patients have acquired varying degrees of active flexion and the cond ton is still improving. Func tional results in the first 8 cases (operated trace were not noted

# FRACTURES AND DISLOCATIONS

Effic, J 8.1 Wounds in the Region of the Hip Joint

The unsatisfactory results in a group of 44 wounds of the hip-holnt and high femoral fractures treated in the base hospital attended by the author prompted a review of the methods used and led to the suggestion

In 1914 to 1918 the mortality in this group was 60 per cent, accounted for largely by visceral inof improvements. juries and a still hip with shortening and often per sistent draining sinuses was accepted as the until result. Recent Russian writing advocates radical surgery with early resection of the Joint or disarrangement of the Joint of the Joint or disarrangement of the Joint of the Joint of the Joint of the Joint of the Joint

ticulation at the hip, to control toxenia. The patients were received from 1 to 4 weeks after injury and had either obvious wounds of the hip joint or fractures in the area of the neck or trathanter with doubtful penetration of the hip joint Twenty two patients had been or still were toxenic when received. All had been explored and foreign fingments had been removed including many bone fingments. Plaster spices or Thomas spinuts were used for transportation and usually changed en route at the receiving hospital where some wounds were re-explored. Systemic administration of suitonandes and penicillin was done routinely. The base hospital employed skeletal traction in Thomas spinuts and plaster fixation about equally. Sequestrectomics and 5 major drainage operations of the Gudlestone type were done.

Ankylosis of the hip occurred in 13 of the 16 cases in which the hip joint became septic. In 16 patients the wounds were unhealed at 6 months. Six patients

had I inch or more of shortening

Slow healing is due to inadequate primary drain age which makes delayed primary suture impossible and later to failure to recognize early the need for sequestrectomy or drainings of hidden abscesses. The use of penicillin massix the presence of undrained pockets and this must be remembered in appraising the situation.

The shattered femoral head must be removed

early to facilitate healing

Shortening is inevitable in head and neck fractures but traction rather than plaster immobility attento overcomes the tendency toward bowing and hortening in trochanteric incutures Early knee motion is of great importance and need be delayed only when the desire to encourage hip fumon requires plaster immobilization rather than traction

in a Thomas splint.

No life or limb was lost in this series but in retrospect, morbidity might have been reduced by the knowledge gained and summarised here. Roent genography before primary treatment is desirable to determine the status of the fracture especially as to whether the femoral head is involved. Bone frag ments should not be removed freely unless they are all or part of the femoral head Rectal examination a emential to help establish the extent of possible intrapelvic injuries. A minimum of skin should be erened-no skin should be sutured-and a plaster spice should be used for transport. Systemic chemotherapy of course is used early and a "booster" dose should be given again before each change of cast or other manipulation to inhibit flare up of the infection.

Adequate later treatment necessitates removal of the cast and careful estimation of the patient a general condition with reapplication of the plaster spice only when analysiss of the hip is desired Constant vigilance for abscess formation or the presence of foreign bodies or sequestra, with prompt largery will prevent persistent sinus drainage and lease the morbidity. Early appreciation of the case requiring radical treatment for deep seated infection, and prompt surgery of the Girdlestone tripe will save life and reduce morbidity. In the author's experience the end result of this treatment has been satisfactory.

FRANCES E. BRENYFORE, M D

Godoy Moreira, F. E. Difficult Fractures of the Neck of the Femur Treated with the Stud Bolt Screw Simplification of Technique. J. Bene Surg. 1945. 27, 595.

In July 1940 the writer reported a technique for treating ununited fractures or otherwise difficult cases of fracture of the neck of the femur with the stud bolt screw. Since then the technique has been amplined. A hand drill has been substituted for the motor drill and the hard cortex is perforated by a hand driven burr preliminary to the insertion of the stud-bolt screw.

Eighty patients have been treated by this tech nique with excellent results and 8 case reports are presented illustrating that good union and function may be obtained. One patient, a 6c year old female was operated on 2 days following fracture of the femur. Four months later she had perfect union with normal function. The remaining 7 patients sustained fractures from a to 18 months before operation, the youngest being 40 and the oldest 70 years old. Of the 7 6 obtained good union and perfect function while in 1 a 70 year old male, nonunion persisted but the patient was able to walk a miles easily. This good result is attributed to achieving solid osteosynthesis by means of the screw. In 2 instances osteotomy was performed at the same operation as an aid to union

A short plaster spica is applied to the knee 20 days after operation and the patient is permitted to walk the spica is removed 40 days afterward

RUDOLPH S. REICH M D

#### ORTHOPEDICS IN GENERAL

Howard J E Parson W., and Bigham, R. S., Jr.; Studies on Patients Convelector from Fracture The Urinary Excretion of Calcium and Phosphorus Bull Johns Hopkins Hosp., 1945

The calcium and phosphorus metabolism with special reference to Ca I concentration in the unne was studied in a group of 17 patients. Thirteen patients were convalencing from femoral and tibial fractures and 4 were studied before and after femoral osteotomy for slipped epiphysis.

This study was made in an attempt to explain two frequently observed conditions in recumbent orthopedic patients (1) nephrolithlasis and (2) a lack of time salts in the bones of limbs immobilized for long

periods of time

A steady rise in the calcium output in the urine was noted. It reached its maximum approximately it month after injury. The peak of exerction of calcium was maintained for an indefinite period. It usually began to fall when the immobilization was discontinued.

A similar pattern of urinary calcium exerction was observed in patients who had had a femoral oxteotomy. The peak of calcium exerction, however, was reached much earlier. In patients who had suffered a fracture x rapid breakdown of protein occurred.

with the excretion of large amounts of nitrogen. The maximum amount of urinary excretion of nitrogen was reached in from 5 to 7 days. It subsided in from 25 to 40 days.

Maximal curretion of calcium in the urine oc curred in every instance at a time when the urinary output of nitrogen had returned to normal. The same reciprocal relationship between maximal diuresis of calcium and nitrogen had been observed in patients subjected to femoral outerous.

The type of injury (simple or compound fracture) and the patient's age, height, and weight or hoay structure (heavy or light bony frame) had no bearing of the urinary output of calcum. The increase or decrease of water intake had no influence on the amount of calcium output in the urine. Alkalinias tion, sulfadiasme, or sulfathiasole did not change the level of the calcium exerction.

Large shifts in detary calcium affected the urinary output of calcium very little. An increased or diminished intake of calcium in the form of calcium lactate had a somewhat greater influence upon the calcium dimens than the intake of calcium in the

form of milk.

Vitamin D<sub>2</sub> (calcifered) in varied doses, with or
without an increased intake of calcium, did not
significantly change the calcium excretion in the
urine.

The rise and fall of intake of inorganic phosphorus showed similar changes in the urinary output of

phosphorus.

The blood constituents of the patients showed no significant changes in the hemoglobin, red blood count, blood volume, calcium and phosphorus levels,

and alkaline phosphatase concentration. The theory that a decreased blood supply causes increased bond density and that hyperemia of the part results in skeletal rarefaction is challenged by the fact that reduction of the blood supply causes atrophy of the issue supplied. Unliateral humbar sympathectomy in children caused the leg on the same side to improve its growth in most instance. This influence on the growth of the leg is exercised by the control of its blood supply. There is experimental evidence that venous obstruction accelerated fracture healing by speeding the formation of callus. Growth I. Rens. M.D.

Beliboni, V. G., Shapiro, I. M., and Kydd, D. M.: The Penetration of Penicillin into Joint Fluid following Intramuscular Administration. Am. J. M. Sc. 1945, 2 o. 588.

Seven patients with hydrarthrosis affecting one or more joints were studied 5 had typical rheumatoid arthritis and 2 an atypical disease which was probably also rheumatoid arthritis. In only 1 case was the joint severely inflamed. Four of these patients received 25,000 units of penicillin in 25 ml. of mor mal saline solution administered intransuscularly every 3 hours and 5 received 40,000 units. In each instance samples of serum and joint fluid were obtained simultaneously X 1 2 and 3 hours after the

patient had received the eighth dose of pencilla. In a instance, however the samples were obtained 3 hours after the sixteenth dose, and in Instance, material was obtained 3 hours after the treaty fourth dose. The concentration of pencillain hoth the blood sens and the joint fluids from these patients were determined by the cop assay method as themse were determined by the cop assay method as

then were determined by the cup assay method as modified by Cholden (J. Bart. Balt., 1944, 47, 403.). In all cases penticilly was found to penetrate readily into the joint which remited in that esentially equal amounts of the penticillae intered the joint fluid and blood serum: I hour after its administration. In the case of the serum concentration, it is true, they fell rapadly after I hour and at the end of 3 hours little or no pencillan was detectable in this body fluid however in the joint fluids the concentration of pendicilla descreased more slowly there being appreciable amounts of pendicilla present 3 hours after the administration.

According to Rummeltamp and Keeler the effective concentration of penicilin in the blood a cylindry and the control of Forey unit per milliller and in the serum, and Forey unit the joint find of the cases studied because the bour after the administration of penicilin showed amounts of penicilin warying from onto the output per milliller and the determinations made 3 hours after administration in 6 of the 79 thems showed that it still contained from one to

The authors conclude, therefore, that the amounts of penicillin which are antibacterial for the common pathogens invading joints are obtained in the synoval fluid by the intramuscular administration of penicillin in the doses discussed.

Penicillin did not tend to accumulate in the joint fluid. Joen W BREENEAR, M.D.

Berans, M.; Changes in the Musculsture of the Gastrointestinal Tract and in the Myocardium in Progressive Muscular Dystrophy. Arch. Path. Chic. 1945 40 225.

In this article 4 cases of progressive mescular dystrophy are reviewed, with special reference to lesions in the myocardium and in the smooth macket of the gastrointestinal tract. Progressive muscular dystrophy has been regarded as an intrinsic disease of the muscles. More recently the disease has been classified as a disorder of the autonomic nervous system.

In the past many workers have found diffuse scarring and deposits of fast in the myocardism of patients afflicted with progressive muscular dystophy. Many others denied having found any pathological changes in the myocardism or gastrontential tract in these cases. Other investigator described a cardiolatestial syndrome in patient with progressive muscular dystrophy which was accompanied by vomiting generalized adolonial tendemess and pain, diarrhes, suchyardis, and signs of cardiac failure. One author found roat genological changes in the exophagus similar to these described in alteroderma.

A detailed account of the history physical find ings, the course in the hospital, laboratory data and antopay findings is given of the 4 patients with progressive muscular dystrophy. All of them died of pulmonary complications. The disease was usually discovered at the age of 4. It terminated with the death of the patient from 10 to 16 years later. The treatment of most of these patients consisted of the administration of acetylcholine, aminoacetic acid vitamins B and C, and other purely supportive symptomatic measures.

All of these patients showed considerable wasting of all of the skeletal murdes on admission to the hospital. No muscular fibrillation was observed. Contracture of the muscles especially of the plantar aponeurosis, gastrocnemius, and hamstings was seen which placed the lower extremities in a froglike position. Abnormally increased mobility of the shoulder, hip and small joints of the hands was found. In most cases reflexes were absent. The electrocardiogram showed a right axis devlations and tachycardia in a few of the patients. The roentgen ograms revealed moderate decalcification and considerable underdevelopment of the bones. In some instances the esophagus was slightly di-placed by a dilated right suricle.

The laboratory data were normal except for a somewhat lowered basal metabolic rate in some cases.

On the autopsy table the muscles were found to be pale thin, and streaked with yellowish fat tassue In most cases the gastroenemus, recti pectoral illopsous and intercostal muscles were most seriously affected in the order mentioned. The beart was found to be hypertrophied and the endocardium was

thickened and streaked with fibrous bands. Some sections of the myocardium and papillary muscles were found to be completely replaced by scar tissue

Alicroscopic examination of the skeletal muscles showed changes usually found in progressive muscu lar dystrophy. Large channel-like structures showing disintegrated muscle fibers in their lumens and capillaries in their walls were very significant. Such structures probably represent the persisting perimysium after the muscle fibers have disintegrated Other findings were great variation of the size and shape of the fibers, vacuolation and clumping of the sarcoplasm and proliferation of the nuclei of the sarcolemns.

Sections of the myocardrum and papillary muscles showed hyalinization fibrosis, interstitial hemor rhages surrounded by mononuclear cells with phagocytosed red blood cells. The lower part of the esophagus showed considerable edema of the lamina propria, and the epithelium was irregularly desquamated The small intestine showed similar changes in the muscular layers. In spite of the edema the width of the walls was greatly reduced and the muscular layers were atrophled. The rectal mucosa exhibited infiltration of red blood cells and areas of autolyzed mucosa. The muscularis mucosa lavers were fragmented. The longitudinal and carcular layers were atrophied and the muscular fibers widely separated

No lesions of the smooth muscles of the vascular system or of any other organs were noted. With the exception of the presence of thymic tissue in 1 case no abnormalities of the endocrine glands were observed.

## SURGERY OF THE BLOOD AND LYMPH SYSTEMS

#### BLOOD VESSELS

Gurdjian, E. S., and Walker L. W: Traumatic Vascepastic Disease. J Am II Am 945 120

It has been known for some time that workers exposed to repeated percussion may develop circu latory disturbances in the hands. The condition is most frequently associated with the use of the pneu matic hammer or jack hammer Pneumatic hammer disease has become synonymous with white fingers, dead fingers, traumatic vasospastic syn drome, vasospastic disease of the hands, and Ray naud a disease

The first report on pneumatic hammer disease was made by Longs of Rome in 1911 while the first report on this condition in this country was made by Cottingham in 1917 Hamilton described the clinical findings in detail in 1918 after studying the problem arising out of a dispute between Indiana limestone cutters and their employers over the use of the

nneumatic chisel.

The clinical pattern of traumatic vasospastic disease of the hands is almost stereotyped. After a few months to several years of exposure to the vibra tions the patient notices attacks of blanching and numbness of the fingers. The pallor is much more pronounced than in Raynaud's syncope but it is not succeeded by the stage of extreme asphyxia so characteristic of the latter. It is not symmetrical even when in both hands.

The attacks may occur while the patient is working Usually the blanching is most pronounced early in the morning particularly in cold weather The attacks can be brought on by washing the hands in cold water or by going outdoors for a while in cold weather They usually come on more frequently in the winter months, when exposure to cold is more apt to occur Emotion does not appear to produce the attacks. The attacks do not result in wasting and death of the tusue. The workers are also sublect to Raynaud s and Buerger s diseases and hemiparesthesias not caused by the vibrations

The present study is concerned with the clinical findings and the microscopic findings in the capil laries and arterioles of the fingers in 6 women war workers using a pneumatic riveter in airplane con struction work in Detroit. The authors do not state the percentage of women affected in this occupational classification but to their knowledge this condition has not been described in women previously Mi croscopic studies of the finger tips have not previously been reported Serial sections of biopsies of the finger tips of 5 of the 6 patients showed no path ological changes except in two sections, revealing a red staining amorphous substance in the capillary

The mechanism of the disorder is as yet unex plained The possibilities mentioned are low tem perature of the surrounding air at the place of work anemia of the hand from holding the air hammer too tightly and injury to the myoneural junctions of

the arterioles in the fingers

The clinical course of these patients has been characterized by attacks of benign vascepasm with little increase in severity over a period of all year of study The discontinuance of the use of the poenmatic hammer has not resulted in a single case of

In the discussion de Takata stated that he be heved that tools having a high vibration rate may produce a percussion neuritis. He mentioned Denny Brown a experiments with a single percussion of a nerve trunk which indicate that the damaged myelin escapes from its sheath futo the endoneural space and sets up an irritative internal disorganitation of a mixed nerve which results in causalita with its inco-ordination of circulation

JOHN E. KINNY VINCE, M.D.

Elkin D C., and Kelly R. P: Arteriorenous Aneuryum. Ann. Surg 1945, 12 529.

A near disaster from hemorrhage from the posterior tibual vessels in the course of the exclusion of an arteriovenous aneurysm prompted the authors to modify their approach to these vessels and remove the upper portion of the fibula, with resection of the head of that bone when it became necessary The collateral anastomosis which develops as the result of arteriovenous communication together with dilatation of the vessels, including those which per forate the interesseous membrane demands direct visualization of these vessels and their careful ligation and division. Otherwise the retraction of vascular channels through the interesseous membrane may result in serious or even uncontrollable hemorrhage and necessitate a second incuion along the front of the leg or the removal of the fibula in the presence of hemorrhage and at an inopportune time during the course of the operation. While this operation has been performed primarily as an approach to arterior enous fistulas and aneurysms of the posterior tibial vessels it is of equal importance to realize that the same approach is necessary to reach the anterior tibul and peroneal vessels in the upper part of their course. The authors prefer continuous spinal anesthesia for the procedure.

The operation is described in d tall with illustrations of the technique. There are 15 case reports given with the preoperative findings. It is interesting to note that enlargement of the heart is not present in all cases, but it is found in some of them and seems to depend upon the length of time from the injury

to the examination made before surgery The authors conclusions are as follows

Careful exposure of the tibial and peroneal vessels in the upper part of their course is necessary in the

INTERNATIONAL ABSTRACT OF SURGERY

made it possible to observe the mechanisms of flow mage, i possinie to ooserve ine mechanism or now turbulence, and the effect of constitution. The still turbulence, and the energ of construction. The artist and peripheral phases of flow could be observed. He and perspectal passes of low cound be observed. If a thread introduced into the lumen was small enough thread introduced into the inmen was small coough the clear peripheral zone, there was its continuous for turbulence. If the thread, because the events of throughout if the threat because of its size or length, projected into the axis place. of its size or jenera, projected into the exist pusses
pranounced turbulence would occur. The effect of a pronounced introductive would occur. The energ of a renterlike countriction was also studied and it was ventralike constriction was also studied and it was found that the turbulence produced distal to the Journal that the turbulence produced datas to the constriction was capable of producing a propagating constitution was capsule or producing a propagating clot. These findings emphasing the observed facts clot. These indiggs emphasize the concrete items that when sood approximation without partial continuous or distortion of the venel is obtained with ecentson or autorition or the vener is obtained with fine close strong no intravascular clot will form and the anastomosis will be successful

ng the anatomous will be ancerning.

Types of salare meteral No calcut of a size com-PARABLE to No coccoon in the obtainable, and no PARTICLE TO NO OCCOOR BIR IS OURSIANDER, AND DO STATE AND ADDRESS OF ARTERISAN WERE STEEN FROM MILE. acting anatomores or arteries were attempted with catigut. Other experiments indicate however that catigut funct experiments indicate however that catigut figation leads to Produce thrombus formation and introduce and interesponding principles of the produce of the prod categoring the state of the sta Goes ligation with site. It would appear tost casquit would not be a suitable material even if it existed in

to necessarily small sizes
It is emphasized that even though thrombous may At a emphasized that even inough informed may come postoperatively. The process is a slow one which, admira of the establishment of an adequate occur postoperatively the process is a slow one which admits of the enablishment of an adequate which admits of the establishment of an adequace collateral circulation so that the end routh physics COURTES CITCURE CON TO COME CHE CHE CHE INCLUSION POPULAR DE COMPANION Agricult may be the same as though period technical replies had been obtained. There are only a second configuration of the second configurati intal ratio and seen solution. There are only a few technical fundamentals which must be addered to the control of the control iconnect innoamentals which must be ashered

to (1) the one alterial nectics and size (NO OCCCO) (4) kep the strong gap less than 1 mm. (4) approximate and size (1) approximate analysis of the size of the si (a) Keep the surinte gap less than 1 mm. (3) approximately (4) the ends accurately (4) the anticoagulants such as the soluble rod technique, when possible to the control of the control o JOHN L. LONDOVINI M.D.

Aceta J. R., Stokes, J., Jr., and Golla, S. R.; Reddended an Sertim Hepsettis and Infections (Reddended) Hepsettis, Experimental Study of Aceta and Course Immunity in University (Rendernic) Hepatitis, Experimental annual or and Cross Institutionally in Solution A Fredingery Report As J. I. S. 945 to

Homologous scrum hepatitis and infectious epi Androwskin serial arpairing and interious spi-Genic apatina navo severa consectorarios ia com mon. Both etiological sernis para through in com serva sont sus not Australia. In house so see Consenmon, both ethological agents pass canongs exercises.

But and are not electroyed by heat at 50 C for 10 company and an administration of the company and an administration of the company and an administration of the company and administration of outers and are not destroyed by heat at 50° U for 30 minutes. Both also produce similar clinical mantles. minutes, stoin and produce number cances manufactured. However, with infections repatitis the tations stowers with infectious represent the compensation is elevated above too degrees and temperature is elevated above too degrees and found in the feets. Epitlemic hepstitis may be precontain a stanuated he masses of human immune. found in the least. Epidemic hepsitts may be pre-vented or attenuated by means of human immune.

The press. vented of attenuated by means of human immune serious globulin, or human adult plasms. The presetum, Potonin, of numan adult plants. And presence of a serice of cross impunity between the limit of the control of the cont ence or storage or cross immunity between the irre-distance has not been established. Six human volum GREATER AND DOLDER GRADIENCE OF NUMBER VOICE (CEPT PROVIDED (TOP) MORROLOGY SCRUM DESCRIPTION DESCRIPTION OF A STATE OF A tens recovered from acommotous serious negatives and failed to develop any acute clinical manifests.

tions upon reinoculation of the causaire agent of tions upon removatation of the executive seem of the distance whereas 8 of grounds control developed the first seem of the control developed the first seem of the first seem beyoutta and joundace. The o vocanteer were an inoculated with material containing the eticipant. inoculated with material containing the etiological developed repairing topolitics and as a reself 5 seems of the control inoculated only one of the control developed hepatitis. Comos mocuniter oray co-tracted epidemic hepatitis, but the control vibiltractor spinomic aspectus, our toe control race where inoculated parentally did not develop to the were inocusted parentally did not develop to the disease. The incubation period of serious kepaths disease. The incubition person or serum acquired to days, whereas that of infection lequititle did not exceed 37 days.

the did not exceed 37 days.

The authors believed that the lack of cross for The authors neweyed that the sact of cross in monthly between the 180 diseases was done to differ manity between the two ducates was one to other control of the two chiefs of the two ence in the anname properties of the two cooks agents, which they believe were not identical to the cooks and the cooks are the cooks and the cooks are the SECURITY VALUE THEY DELIVER WERE NOT INCIDENT IN THE ADDRESS OF TH the aggentum, it was noted that recently 5 votes there were found to be restrant to reinfection by the teen were tound to be reasonal to remeeting of the agent of infections herself in for a period of 8 months after recovery from this same disease.

BENJAMA G P SUMMENT MAD

LYMPH GLANDS AND LYMPHATIC VESSELS Lossia, L. and Crave L. F. The Districts of Blood J. Rever 1945 1 75 Agriculton Biopy

Biopay by means of aspiration through a mention Associated by means of aspiration through a new comments and properties in method of obtaining the comments of as octome an induspensante memor of columns there for indroceople diagnosts at the Memorial of them for introscopic marrows at the atenness. Hospital New York. The technique is now well assessed. Hospital New York the technique is now was examples and the method has been repeating described. The authors herrwith, report in details that described The authors herewith, report to occasion the steps of application biopsy according to their the steps of application propey according to use technique. They state that naturally first care must be used. (i) in accusate localization of the formula for the state of th must be used (1) in accounts become on the straight lateral reentgen than (2) in floorance and chock of the manufacture of the

straight lateral recrises hims (4) in mormons therefore of the position of the point of the needs (3) in avoidance of traums to the inns (4) in avoidance of traums to the inns (5) in avoidance of traums (5). Coy and a various of the state ance or any remux or injection or inflor material in the long or into a blood vessel and (c) in ar into the ining or into a plood vesse; and (1) in keeping the patient horizontal during the precedur, and very quiet for some hours afterward. Currently and very quiet for some bours alterward. Currently a considerably greater number of intrapolations of interpolations of the property of the pr a commerciary greater number or interpressession malignant transparate projection microscopic disposes as a security of satisfactor belong rather than as a complete form of the following the latter than as a security of temperature belongs to be latter.

result of bronchoscopic bloppy although the latter Procedure is always given precedence unless it would obviously be meless Among 243 cases of histologically proved Hodge has a disease treated at Memorial Heighted for the most state of the case of th

most part within the part of years, the disputation and watching has been been been and white senior for must place within the past 5 years, the magness of the past 5 years, the past 5 years of the past 5 years, the past 5 years of the past 5 years, the past 5 years of the past 5 years, the past 5 years of the past 5 years, the past 5 years of the past 5 years, the past 5 years of the past 5 years, the past 5 years of the past 5 ye establing by open money in 110, white assets the classical and state of the classical and the classica In the 14 cases of Hodgkin s duesse in which the dismosts was made by examination of the sectioned cot obtained by annuation biopsy the material was from the lymph nodes in 9 cates, from a printing and and the lymph nodes in 9 cates, from a printing and the second secon nodate in 1 case from the lung is 3 cases and from

Among the 228 cases in which formal biopsy was gred to prove the districts assured terms only and

been previously attempted but had been unsuccessful in ir cases. Thus in 25 cases of the total number of 242 aspiration biopsy had been selected as the first method on trial for good reason and was diag postically successful in 50 per cent of the group

The authors conclude that in cases of Hodekin a disease without enlarged peripheral lymph nodes yet with nodes or masses accessible to needle punc ture the method of aspiration biopsy has often proved successful in establishing the diagnosis. Success depends in large measure on examination of a sectioned blood clot from the aspirated tissue by an experienced pathologist.

HERBERT F THURSTON M D

#### MISCELLANEOUS

Sarmiento P B : Some Consideration Concerning the Surgical Treatment of Elephantiasis of the Extremities (Algunas consideraciones sobre el tratamiento quirurgico de la elefantiasis de los miembros). Rec espan cir tranmat ortop 1945 3 146

The majority of authors agree that a primary irritation of the lymphatics predisposes to a septic infection which in extreme cases may lead to elephantusis. The condition is characterized by an exidate rich in leucocytes fibrous hyperplasia and thrombosis and obliteration of the blood vessels in the subcutaneous tissues. In many instances no streptococci or parasites can be found and a special susceptibility of the lymphatic or lymphonenous system must be assumed. The causes of such abnormal conditions of the lymphatics may be of a local or general character

As to the treatment of the condition Cornachan suggested ligation of the main artery but the result ing necrosis soon discredited this operation Wintwarter recommended a gradual compression of the main arteries but the same objection may be raised to this procedure as to ligation of the main artery Buchoman suggested ligation of the main vein of the involved extremity while Leriche recommended a periarteral sympathectomy basing his recommen

dation on the hypothesis of the existence of sympa thetic fibers in the lymph vessel walls. Rogers ad vocates extensive removal of the involved tissues and insists upon the necessity of reneated interventions. Hanley described a procedure which he calls "lym phangioplastic, consisting of the introduction of silk fibers into the affected zone and extending them into normal regions. In this manner he expected to establish artificial capillary drainage from the in volved to the healthy tissues. Le Dantec supple mented Hanley's procedure by immunization with a certain vacance Walther buries rubber tubing in the involved tissues while Lans extirpates extensive portions of the tissues and introduces fascial strips in order to establish drainage. Kondoleon suggested an externation of the aponeurous in order to facilitate deep drainage. Payr and Oppel described simi lar methods. Castellani advocates daily injections of fibrolysm or acetosalicylic thiosinamine. Mata recommends the administration of strentococcus vaccine before any operative intervention.

The author operated on a 39 year old woman who developed a suppurative process in both inguinal regions at the age of 15 years. Following these lesions a tremendous elephantiasis of both lower ex tremittee gradually developed. The author believes that repeated infections in the form of dermatitis. probably of a streptococcal origin led to an infection of the lymph glands and lowered the resistance of the skin. Apparently repeated dermatitis with resulting lymphangitis produced cutaneous alterations and changes in the lymph vessels.

As to the treatment the author employed a procedure consisting of resection of a large amount of tissue. He followed Sistrunk's technique modified by kondoleon. In extensive cases of elephantiasis the operation must be performed in stages.

The author resected 95 kgm of tissue under spinal anesthesis from the left extremity and a similar amount from the right extremity Catgut No o was used for ligatures and the tissues were approximated with catgut No 3 A check-up 8 months later showed very satisfactory results.

JOSEPH K NARAT M D

# $SURGICAL\ TECHNIQUE$

# OPERATIVE SURGERY AND TECHNIQUE POSTOPERATIVE TREATMENT

sers, C. Jr.: The Hypochlorenic State in Four cases are presented which martine an ex-Cour cases are presented which universe an ex-ception to the rule of withholding salt administra to a contract the court of the court ception to the rule of withnougher sait against the tion postoperatively. These cases are examined to the cases.

ton potoperatively inche cases are examines to consider a considerative form author constantly birth considerative with the constant with severe hypochlorems following estensive burns chronic bigh intesting pyloric extensive burns bigh intesting pyloric extensive with characteristics obstruction, and billary obstruction, respectively

Detriction respectively
The condition of hypochlorenia is equivalent to Are conducted at approximation in equipment to the subscript to the subscript loss of the subscript loss. deat exhaustion passing into the subscrite of thorough the persistence of the chloride least the charge leas chionic phase due to persistence of the entoride fees difficial recognition of the hypochioremic state is a second to the hypochioremic state is second to the highest difficult recognition. Cilinear recognition of the hypochioremic state as difficult because of its rarily and the bita or clinical difficult accepts of its fairly and the bisarie clinical picture it presents. The conditions most commonly contained with the conditions most commonly contained to the conditions of the condit picture it presents. The coodinous most commonly associated with the loss of large quantities of elecassociated with the total of large quantities of elec-trolytes are stationaged and drafting quantities of elec-struction with vomiting permitten external billiary actually, high internial satula, extensive granulating outland, received granulating expensive stations of expensive descriptions. institut, high intertinal intitus, extensive granulature from a long moment force; and excessive granulature from a long moment for disting sultan models. auntaces permittent lever and executive sweating from a long operation during sultry weather.

The clinical manifestations of the hyperboreout the state of the s

state may be classified as either produced or ad Affair may be classified as either programs or an advanced symptoms are acute and Vanced. The advanced symptoms are acute and similar to those of surgical shock and estimate.

They are normally characterised by: amust to those of surgical spock and efficiency.

They are canally characterized by a protestion they are usually characterized by a subnormal temperature of from 97 to 92° p. systolic characterized and a soft satisfication of the subnormal and a soft satisfication of the subnormal and a soft satisfication. sannorma temperature or from 97 to over a system blood pressure of 80 or below, and a soft, easily compressible pulse which is almost unobtainable. compression putte which is almost uncorranged.

The skip is cold and clammy and excessive thing. The skin is cold and clammy and excessive thing accompanied by extreme weakness and prestration

Common
The acute advanced symptoms may be preceded In some savanced symptoms may be preceded consist of mild examples produced asymptoms which consist of mild examples positions asymptoms which mild examples provided the production of the consist of mild examples and the consist of for several days by the programs symptoms which comming of mild cramplific pertistent abdominal print and a standard of the st control of muo cramputes persusem accomman pain, matter moderate abdordinal distention, and reneutral moderate abdorounal distention, and re-Peated vomiting of small amounts of the stained and the patient may appear languid or downy and may decide a intra really bleamen. According to the control of the control and may develop an intractable biccough. Amorris and tony develop an intractable occurring. Another is almost always present, and bowel movements or the same and the same is almost signays present, and bower movements or are fairly contains. The cludest similarity of the are leavy commune. And country annuarity or the agit intodestion—the scate abdomen, sait intoncation—the acute abdomen, Post operative lieus and intentinal obstruction due to operative new and intestinal operations due to institutional edema-marker it extremely difficult to

nutritional edema\_maker it entremely diment to differentiate these conditions, except for the finding of a low blood chloride in the clinical conditions. Number of Carly disposal of the hypotance of carly

the importance of carry displaces of the appearance state is appearant, since the condition may Chloring state is apparent, ance the condition manapidly progress to fatality from an extreme shock. Applicity progress to likelity from an extreme shoer like state with uncompressated alkalous and extra the fine with uncompensated sizatous and extra femal activation. Active therapy comists of matrix and and active therapy comists of matrix renal antenna. Active therapy commute or massive duld and sait administration preferably for the

Intravenous route. Shock due to the acute byochiorenic state win not respond to the count and introduction of blood plants, and noncorrection of the count and noncorrection of the count of the tions are accurate guides to treatment.

Star I., and Mayock, R. L. Coursements from Arr i., and happen, R. i., Coursissance from Surgical Procedures. Studies of the Group of the Group of the Group of the Exercise of the Group of the

The purpose of the authors are the purpose of the authors are for collective abnormalities during course, come from airgical procedures by available special values and by other methods which might be conce from surgical procedures by available special control of and by other methods which might be declaring and by other methods which makes to declared. If one could discover objective absorbations and the could discover objective absorbations of the could be co devised, if one could discover objective absormation that the might be used as a test for the duration of the trey might be used as a treat for the curstam of considerance and also as a mean of judging the CONTRACTOR AND AND AS A MEAN OF POPULAR ASSESSMENT OF SABORE OF SA SUCCESS OF EASURE OF SELECTION IS SUBJECT THE COMPANY OF THE PROPERTY OF THE P increase which was also part of the authors proved. In planning the work the authors expected that for almost when convolved to found when convolved to the control of the convolved to the convo augmentation would be lound when conversed as the subject were studied at test, but when they were supercus were studied at rest, our when long were staked to perform tasks, it was expected that about the state of the sta AREA to perform takes it was expected that above madities would be discovered. For such text, truly matter woung or autoverent For men tens, una that the patients were accustomed to were preferred that the Patients were accustomed to were processed. The first test consisted of observing the County is the county of the count An entities committed of observing the transpara-tion distribution which took place on artifug the secthe circulation which took piece on arrang the sec-ond of studying the effects of mild electric that of pushing up and inverting a weight. The results of the latter are reported chewhere.

Forty-four patients, were studied before and re-Four four patients were studied before and re-peatedly after surgical operations. The test need pertently after surgical operations. The test men consisted of estimates of the pulse rate bood proconsisted of extension of the pune rate bood pro-standard extilic output (ballistectriligram) under standard conditions in back, i.e. homeonal and we aure, and certain output (outputocertungtam) once assandard conditions in both the bornontal and tell the constitutions are the constitutions of the constit

The average of the results obtained in a case operated upon for hernia disclosed that the following operated upon for nerms assessed that the totoming stansform changes occurred during postoperative convalescence

In the horizontal position the cardiac output mas As the notional position the cardiac output its diminated soon after operation, and the blood principles of the cardiac output its principles. sare was diminished later In the vertical position the pulse rate was increased, the cardiac output ton puse rate was increased, the carmer composition of the increased and the article blood presents of the carmer composition of the carmer composit sure tended to be diminished.

The difference between the lying and standing palse rates increased, and the ratio between the bing and standing Cardiac outputs was changed after opand scanning carrier outputs was changen sucrossession. There was more tremor on standing and occasionally the subjects were unable to remain standing after operation

After more serious operations the changes found in convict more serious operations the change some or contraction after heriformaphy with two competents were generally amount to mose or

(1) the administration of large amounts of fluid by vein prevented the postoperative fall of the cardiac output or caused it to increase, and (2) when the operation permitted better nutrition of the patient improvement from this cause far overbalanced the effects of the operation per se.

JOSEPH L. NARAT M D

#### ANTISEPTIC SURGERY TREATMENT OF WOUNDS AND INFECTIONS

Laiich J J., and Mason J M., III: Resuscitation of Severely Wounded Casualties Surgery 1945

During the North African and Tunisian cam paigns and the Anzio-Nettuno beachhead operation in Italy a great number of severely wounded casual ties were observed. Many men came into the receiving tent with a blood pressure of o/o. Their condition was judged by the manner in which they responded to transfusions of plasma and whole blood It was believed that in cases in which the systolic pressure rose to 80 mm of mercury and remained at that level the chances that the individual could under go a major operation would be quite satisfactors However in cases in which there were compound head injuries penetrating wounds of the chest or abdomen, or compound injuries of the femur it was more difficult to get the casualties prepared for surger. It was felt that plasma or blood could be given fairly rapidly. When the degreed systolic pressure was not maintained reasonably, the patient was given a high priority for surgery. Hemorrhage was the greatest cause of a drop in the blood pressure in this group. Infection and cardiorespiratory embarrassment must be combated intelligently in association with severely wounded essualties. If and when the systolic pressure dropped in the preoperative and surgical phases of treatment, during the time blood or plasma was being injected the drop in pressure was combated by increasing the amount and rapidity of the infusion

When the systolic pressure reaches 100 mm, the patient should be given an additional 500 to 1000 c.c. of blood, either preoperatively or during surgery before resuscitation is considered adequate.

Three cases are reported in detail to illustrate the

points brought out.

RICHARD I BERRETT JR. M.D.

Rawles, B W 1 A Routine for Early Skin Grafting of Deep Burns. Surgery 1945 18 696

This article presents the experience in the treat ment of a group of 154 patients with burns in an overeess U.S. Army General Hospital in Italy during a period of 14 months. Forty two or 37 2 per cent of the burn cases, required grafting as compared with 54 per cent of a group of 78 burn injuries proviously reported the great difference being due to the position occupied by the hospital in the chain of evacuation during the two periods. In a number of instances the burns were associated with injuries

of the nerve bone and soft parts since 33 per cent of the patients had been wounded in action. The author's study deals primarily with the late manage ment of deep burns since a majority of this group received the initial treatment in other medical installations and were transferred to this hospital from a few days to several weeks after the injury

The control of infection is of paramount importance at this time if prompt healing with early and successful grafting when indicated is to be accomplished Infection besides jeopardizing the life of the pa tient complicates the successful treatment of burns in the following ways (1) the healing of second degree burns is delayed (2) deep second degree burns with sufficient viable epithelium for complete coverage may be converted into third degree burns (3) in third degree burns deeper destruction of tissue occurs with an increase in scar tissue forma tion (4) grafting may have to be delayed unnecessarily and may even be unsuccessful and if so is followed by the formation of more scar tissue and contractures and (5) even after the successful take of grafts, furuncles and pustular infection delay the healing of small uncovered inbetween areas and destroy portions of viable grafts days or weeks later The problem therefore in burn therapy after shock has been overcome is to control injection and obtain a closed wound as rapidly as possible either by the healing of undestroyed epithelium or by skin grafting

Penicillin is used in the primary treatment of burns and is given intramuscularly in doses of 25,000 units every 3 hours. Infection is controlled in the majority of cases, provided the primary dressing is left undisturbed for from 12 to 14 days. It is the author's impression that oral sulfadiazine is just as dependable as penicillin during this stage of the treatment. Any drug therapy is only an adjunct to good surgical management (originally described by Allen and koch) and briefly consists of (1) metic ulous cleansing of the burned surface and (2) a resilient pressure dressing with fine mesh grease gauze next to the burned surface. This should not be changed for from 12 to 14 days. Care is taken to aplint adjacent joints and in the case of the extrem ities, to see that the pressure dressings begin at the toes or finger tips and extend well above the burned area. Elevation of temperature occurs when this routine is used but only on rare occasions is it necessary to change the primary dressing any ear lier than 12 to 14 days for the purpose of inspection All dressings are done in the operating room under strict surgical technique and if the burns are at all extensive, with the aid of an anesthetic. A majority of second degree burns are found healed when the primary dressing is removed and there is only min imal contamination or infection in the case of deep burns. All loose, dead skin and the tops of unbroken plisters are removed in unhealed second decree burns, and a second petrolatum gauze dressing is applied and left undisturbed for another period of 10 to 14 days. Healing is complete in the majority of the remaining patients when the second dressing

is removed, except when there are areas of full skin INTERNATIONAL ABSTRACT OF SURGERY is removed, except which had not been previously

cognition of full thickness burned skin and its Prompt temoral is necessary if grading is to be in prompt removal is necessity if Resiling is to be done early. The identification of nonvielle skin by concerny the menuncation of nonvasor skin by means of sodium shoreseedn and the exchange of sodium shoreseedn and the exchange of sodium shoreseedn and the exchange of some state of the state of the solid state of the soli ment of sodium interests and the crosses of such areas followed by immediate starting when such area, louower by immediate statute when the burn is first seen or at the time the first or second the burn is first seen or at the time the first or second dreading is done has been suggested. The practice dreams is done has been suggested. The practice is to exceed all or as much demarkable alongs as is to excee all or as much demantated using a second of the first change of desiring and a second of the first change of desiring and a second of the second positive at the time of the first change of decamples at intervals of 3 or 4 days until all of

a renoven In the author a experience mousture often seemen of the strough of bacillus programmes, and strong to entance the growth of pacifics Procyaneus, pro-teur and other contaminants, and materiale the feur and other contaminants, and muscratter to service of Lyon, the beam applying that at the tag from the feather than the f Service or Lyons, no began applying dry and mean same pressure dressings after the last slough had Fine premie dreams; siter the last month na-been removed, and continued or began giving pen-tions in the continued of began giving pentions. been removed, and continued or began given beautiful informatical middle of 15,000 unit over the continue of 15,000 unit over the continue of Cum intrametenary in does at 15,000 min every 3 hours. The dressing is left and siturbed until the J notes the dressing is lest anomitatived until the chartest is taken to the operating from 4 to 6 days patient is taken to the operating from 4 to 6 days the blood values to normal with translations of orms the oxon vames to norms was transmisson to blood or planns, as indicated.

The following a dvantages fewlit from this routing transmission of the contract of the contrac

the following agrantages result from the following Effection is controlled, eccord, existing is more successful since infection is controlled and the more recently once injection is controver and an execution is continued and an extensive the continued and an extensive the continued possible and the continued to continue the continued the continued to continue the continued to continue the continued became this munne maker carner graining positions third, the patient's discountors in greatly reduced by the same and resulting forms and resulting forms. thin, the patient's discountry is greatly between this simple routine fourth, sear times and resulting this simple routine fourth, car made and resulting the amount of dressing drags and gratifus fifth amount of dressing drags and stratifus fifth amount of dressing drags and other strategies. the amount of oresings origin and other supplies to treating a burn is reduced, needled necessary for treating a purp is reduced, medical personnel are freed for other duties, and many days of hospitalization are saved.

of nonpitalization are saved.

Then this technique is used the burn wounds are
found covered with healthy granulations at the time
of crafting, although a no class a nonclosed, the disc. found overed with healthy granulations at the time of grafting, although 4 or 5 days previously the disaction was carried down to subculations that the disaction was carried as an observation of the disaction o Accidental Carried Gown to Riocciancous Dates.
These Standardous are not distincted. However in Ance Resultations are not disturbed. However in the patients admitted late, it is often accessive to the fact of the patients admitted late, it is often accessive to the patients are always question and are supported by philips. The patients of the patients are always accessive to the patients of the Facin are aways used, and are removed other with the Padgett definations of with a modification of the man bank and are a sile a modification of the the reason occupations or with a monance tion of the Blake Brown knife with a roller attachment. Critical Biggs Brown King with a long attachment. Units as not subtred in place except in the case of large are not entired in piece except in the case of segmentions about a meet it is important to the out-Germatomo Roccus, when it is important to up so it stricts of the akin to the original size is to be obstrend of the sain to the original size is to be on-tained. It is the experience of the author that make bosome from a sharent within a few minimum and minimum a states, it is the expensive or the author that safety become family adherent within a few minutes after being close states being close to the safety being close to the safety

gratic become numity adherent within a now minutes after being placed, because the necessary substances for the meanon that for adherence are present in the wound listed Funded and purple infection is and about the Function and positive infection is and about the field area an office be a problem. A root drawns and a the infection is a first drawn and a the infection. Fruiter are On our de a prodem. A vivi occusor servado the infection, mecratics the thin, and many aptracts for intertwin, inscented the same and many from leads to proceedings and process containing a first delays the bashing ways of small process containing a small process of small process time leads to proceed and process contamination. All of this delays the besling-over of such as which are HOLE OF THE HOLE OF THE OFFICE OF THE PARTY OF THE OFFICE OFFICE OF THE OFFICE OFFICE OF THE OFFICE OF THE OFFICE OF THE OFFICE OF THE OFFICE index ween a reas or uncovered edges which are sometimes present when an extensive area must be

grated. In the author's experience, periodic pres Defendency does not control such microla whose solutions are used to be fact, and sulfadating whose solutions are used to fact, and sulfadating whose solutions are solutions and sulfadating whose solutions are solutions and sulfadating whose solutions are solutions as solutions are solutions. solution) are used in fact, oral substanting serious to be more effective under these conditions fermions. to be more elective under those conditions accounts from the periodic of the first and gratical sites at our the fairnal courses or discourse whose course but been much infection present. String of course which course with a substant of sites of the course ever there has been much injection present. Strips of of pendellin to each cubic continuent of 100 min.

of penicilin to each cubic centimeter of narral siline solution and placed over the stuffed fround status southern and parted over the gratter would too napid absorption of the solution by the orthipst and the solution of the solution by the orthipst and the solution are the solution and the solution and the solution are the solut too rapid absorption of the solution by the overlying day dresding, and is changed once daily until the ary arrang, and a changed one cany much be infection is controlled. The seems like a pursue there is the pursue of drawings during the same arranged to the pursue of drawings during the same arranged to the pursue of the pursu ance introduct change of organizations to exceed the board, and previous to smithly in strated stage of the Durn, and previous to grating in stressed as being very necessary if infection is to be onas ones very necessary u uncernor is to be con-ficiled. When drawings are not changed for 3 or 4 tround, When distances are not changed for 3 or 4 from the economication of time it remains a few forms of the changed for 3 or 4 from the economication of time it remains a few forms. day, destruction of previously range from the accumulation of pur, if purpose or for tion the accumulation of pas, it permits or for finder are present in the Rathed area. Funnels unces are present in the scatter area. Furnaces and positists infection after scattered area. Furnaces by the use of penicillia direction.

Rubin, L. R.: Configuous Elda Flaps for Wounds of the Establishee. Am. J. Say 1915, 7. 35 Closure of avulsed wounds in which the loss of Course of avalent wounds in which the ion of the use of tube and fast afternive may be effected by the course of tube and fast after a two per effected by against with the aid of after attempts to som-charts, his experience with to selected was weards, and charts, bit experience with so selected was remaind charts, in expensive with 50 selected was worked to the various configuous akin flap techniques.

The skin adjacent or continuous to a wound in no the adjacent or contiguous to a wome a mobiled by the use of planned incisions which per a fire also a fire a f modified by the use of planned inclusions which per mit the continuous akin to cover the defect after almit toe contiguous and to cover toe cover after so-Valuement, rotation, or transportation of the season fig. Often extensive endermining opens large treatment of the contract of deposition of the control of the con of these to become investor, but chromotomy with penicilli, reduces the hand time particularly with periodicity, reduces the matter.

The author has also made use of multiple trans-

Any attnorman and made use or murape trans-fractions, where indicated, to air wound healing. This technique is applicable to wounds required movement stems which for the contract frequency. them and transpared as appearance as revenues required to senting a senting of the senting and new sein ausme which (1) will cover exposed done, in and a principal manele defects (1) will only a subsect to moderate manuals when four for mixture. and (a) will not consider the first back to make the same of the s and the contract contract the contract that skin manipulation beyond a certain point will that here manufactured overtime a certain point among the blood supply as to four the ore of continuous as in Real Property as to four the ore of the continuous as in Real Property as to four the continuous as in Real Property as to four the continuous as an alternate wheel contiguous skin flaps. To assure an adequate blood supply the sape must contain all layers of fat down supply the major most contain an inverse or in toward to the deep facts. The flaps are most successful to the word black. The haps are most succession where the skin is larges on the abdomen, hark and face. Only clinical indemnent determines the limits stress can same at any as on the appropriate face. Only clinical indigeness determines the limits

Buried absorbable autures along with plaster of Paris aplints are used to relieve the tention at the darn spunts are used to remove the transce at the edges of a wound. Planned incircors are made along cuges on a women. Figures memors are more asset and irregular wounds are transformed

into geometric designs (triangles and rectangles). Closures are effected to give figures H, Y Z, T etc. Wherever the position of the flap necessitates carting arcses the main sources of blood supply the author employs the technique of delaying which uses the principle of a gradual, rather than a sudden reduce through the akin, subcutaneous tissue and fat, is completely lifted from its bed, only to be replaced immediately and resultured in its former position until the blood supply at the base becomes adequate. This may require multible stage operations.

Local anesthesus, even without adrenalm should never be used. The injected fluid acts as a mechan ical barner to capillary circulation and of course adrenalm is contraindicated because of its visuocon stricting action. Brachial block for the arms and spinal anesthesis for the lower extremities are recommended. For individuals with a high vascular torse, who are sensitive to the visuoconstrictive effects of cold, pain, and trauma use is made of lumbar paravertebral block (below) and stellate block (above)

Direct heat to an ischemic area favors necross because the local metabolic needs are more greatly mcreased than is the blood supply. Nevertheless, heat applied to the trunk of the body is beneficial by virtue of reflex vasodiliatation in the extremities without an elevation of the local metabolic needs.

In instances of associated nerve injury it may be best to use a split skin cover immediately and to defer the flap closure until the nerve has been repaired.

The contiguous skin flap is designed primarily for utility and no attempt is made to obtain a counctic result.

DAVID H. LYEN M.D.

Newman, P. H.: Early Treatment of Wounds of the Knee Joint. Lascet Lond., 1945, 249, 632.

This article deals with the treatment of wounds of the knee joint The author classifies these wounds as alight, moderate, and acvere, of which there were 10 30 and 8 respectively He discusses the diag

nears of the type of joint injury and the treatment. In the first group application, intra-articular penicilin, and immobilization by means of a plaster cast was found sufficient. In the second group careful wound inchion, primary sture, intra-articular and parenteral administration of penicillin with immobilization and extension in the Thomas splint were instituted. Among the 4g cases in these two groups there was only z case which gave him much difficulty

In the remaining 8 cases falling in the "severe classification because of the time element and con tamination 5 of the wounds were left open. The other 3 were closed and treated the same as those in the first 2 groups.

Foreign bodies were removed at the first operation whenever this procedure was reasonable and possible. A separate incision was found to be necessary in a few cases. The importance of preoperative

roentgenographic films was stressed. The author also calls attention to the fact that nonradiopaque foreign bodies such as wood and glass may be a source of trouble. Frequently the history of the accident will put the surgeon on his guard in the last type of case.

PAIR MERSELY, M.D.

Caldwell, G. A.: Secondary Infection of Wounds.

Ann. Surg., 1945, 122, 641

Secondary infection following the original infection of an open wound is so commonplace as to pass innoticed. The average surgeon accepts it as a marter of course and unless the patient s life is endan gred or ha leg is about to require immediate amputation he thinks nothing need be done to improve the situation Actually secondary wound infection is the principal cause of delayed healing and impaired function. Moreover such infections are to a great extent preventable and even established in fections can frequently be eliminated

Primary wound infections (to distinguish them from the secondary) are those caused by bacterial contamination at the time of injury. These bacteria are derived from soil, clothing skin and foreign

bodies

Secondary infections are those caused by bacteria introduced into the wound at any time after the initial injury. These invaders may come from the skin of anyone touching the wound from unsterile in struments or dressings, or from the respiratory tract of the patient or of his attendants. They may fall into the wound with dust from the floor of a ward and may be drawn by capillary attraction through a soggy dressing which is in contact with solded lines

Only 5 per cent of fresh wounds were found to be infected with hemolytic streptococci and staphylococci and bacillus pyocyaneous upon admission to the hospital, but after a week in the institution 50 per cent of the wounds contained secondary invaders and later on they were found in from 70 to 80 per

cent of the open wounds.

Pathogenic organisms can be eliminated in most case by the body's defense mechanisms when these are aided by adequate surplical debridement. They eraist as serious or trivial infections in from 10 to 25 per cent of cases. They appear as new invaders and produce serious and trivial infections in from 20 to 50 per cent of cases. Of the serious persistent in fections developing in wounds probably at least half are caused by becteria secondarily introduced.

In view of these facts the "lasses faire" attitude of suggeons toward secondary wound infections is not justifiable. Surgeons are correct in placing major emphasis upon the general condition of the patient and adequate drainage but are incorrect when they ignore the changing bacterial flora in the wound under treatment.

Detailed modes of treatment including meticulous operative technique supplemented by the admin stration of sulfonamides or penicillin before and after operation are described and illustrated by cases

HARRY W TINE, M.D.

INTERNATIONAL ABSTRACT OF SURGERY Birks, P. M.: Infections of the Superficial Palmar Space Lance Lond 1945 249 669.

The author presents 5 cases to illustrate the effects And aumor presents 5 cases to interest our of incorrect and correct management of infections of or morrors and correct management or infectious or the superficial palmar space. These infections have sained little recognition by virtue of their compara samen near recognition by virtue or their compara-tive rarity and the III defined anatomical nature of the space. The space lies in the hand between the the space, the space was in the many verteen the palmar fascia and the flexor tendons, proximal to parinar lascia and the mean tenuous proximes the transverse crease of the palm. It is doubtful if the transverse crease or the paint, it is document it exists in the normal hand. According to Iselin, the boundaries of the superficial pretendinous central palmar space are Anterior the palmar fascia

Posterior the tendons and lumbrical muscles Internal the fourth intermets carpal space

External the union of the palmar fascia with the intermuscular aponeurosis of the second metacarpal Proximal the union of the paimar fascia and transverse ligament

Pistal the fusion of the middle palmar aponeu rests with the superficial transverse ligament Fluid injected just through the palmar fascis mixes feely with fluid injected through the web of mixes treety with many injected through the wood the middle finger into the middle pairmer space. However indefinite this space may be in the normal hand a collection of pus behaves as though it was confined between tendons and palmar fascia. In the carly stage extension of the infection occurs princi pally through the palmar fascra

Cluically in from 3 to 10 days after injury the hand becomes painful and the paim sweller and pecially proximally and a purulent blister collects under the skin. The fingers are semillaxed active movements are restricted and painful there is little

edems of the dorsum but a great general upset.

The abscess should be opened before the palmar fasca sloughs (that is, early) under unhurried anesthesis and with a tourniquet. The incision should be over the most prominent part of the swelling and in the line of the crease. The fascia is opened with ainus forceps. The superficial palmar arch under the anna roveps. The supermust parmar areas under the fasca is pushed out of danger by the pus. Tuberare unnecessary for drainage. The after care consists of

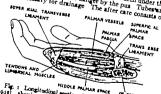


Fig. 1 Longitudinal section through hand (after Cutter (see showing anatomical position of the superficial OF CAMPATUM pulmer space

immobilization on a wire aplint with frequently DAVID H. LYNN M D

Pract, E. L.; Glinkal Tetanos. J in M in

The classification of 56 children with tetanes in the order of the severity of their infection was of the the order of the seventy of the importance was or use in crainating the methods of training emporen.

There was no evidence that amounts up to 80,000 Andre was no evidence that amounts up to concern and of tetanus antitorin was more effective than amounts of 30,000 units. The intratheeal adminaamounts or some more traction of tetanus antitoxin was probably but no definitely more effective than the intramuscular or intravenous administration of the same amount of

Fatal reactions occurred from tetanns antitoum arven intrathecally to some patients, who in all likelihood, would otherwise have survived their tetams infections. Hence, tetams antitoxin should not be used intrathecally in any but the most severe not be used intractive any one are more access, if it should be used at all, until a preparation is available which is incapable of producing screen

Extraion of the site of infection, once clinical symptoms of tetanus were present, did not smello rate the course of the disease.

Neel IL B., and Cole, J. P.; The Bacteriniary of War Wounds in the Pacific Area, U.S. Yea.

A hospital ship in the Pacific area treated 2 740 fresh battle casualties in a little over one year. Cal ture of all of these wounds was highly desirable, but physically impossible because of the abortness of time, the large number of casualties and the large laboratory personnel. One hundred and sixty-one cases had wound cultures. These were severe wounds caused by shell fragments in 86 patients bullets in

In contrast to civilian wounds, which are usually seen by a surgeon within a few bours these wounds did not receive treatment for from 24 to 48 hours because of the ferocity of battle and the difficulties secure of the terocity of basic and the distance of transportation. Eighty three patients in this group had their wounds cultured and were under

treatment within 34 hours. An additional 30 patients were seen during the second 24 hour period.

Whenever possible, tissue was taken from the wound for culture. When it was not available, swab cultures were made on blood agar and tryptone broth for acrobic organisms. For anacrobic organisms, a destrose agar stab bested at 70°C for ro minutes, a meat infusion med um, a destrose-gar tab unheated, and litmus milk were inoculated

The authors attention was centered on anseroble cultures, and 160 wounds were cultured for amerobic organisms. Of this group 77 (48.12°c) were positive.
The most frequent anserobe cultured was the clostridium perintum, present in 57 of the 77 wounds.
Unclassified proteolytic anscrobes were present in 24 cases, and 23 wounds yielded more than one species of anarobe. Clinical gas gangrone developed in 37 cases (35% of the anaroblesily infected wounds.) and in 1 case which failed to yield anaerobes on the

admission culture. Clostridium periringens was the offending organism in 26 cases of gas gangrene while the other case was caused by the clostridium

septicum.

Direct smears from fresh wounds do not provide a reliable picture of the bacterial flora so one must depend on cultures. Early information is essential particularly in the case of anaerobes, in order to institute treatment before the infection gets out of control. The patients whose wounds yielded anaerobes were carefully observed and the earliest signs of clinical infection detected. This information led to early amputation and probably saved the lives of several patients.

Aerobic organisms were cultured from 120 wounds, and in only 14 wounds were the cultures negative. The staphylococcus although frequent, usually remained localized. A case report of a serious committed localized. A case report of a serious committed localized.

plicating aerobic infection is presented

The value of local implantation of sulfanilamide in the effort to prevent and control infection is doubtful. The authors did qualitative chemical tests on serum from the wounds of patients or on macerated tissue removed at débridement and found that sulfa drugs were present in 60 83 per cent of the wounds from which are robes were cultured and in 57 ta per cent of the wounds from which anaer obest were cultured. Therefore the local use of sulfornamide certainly is not bacteriocidal. The value of the drug as a bacteriostatic agent is more difficult to evaluate.

The wounds of 2 patients from which the dostediam perfringens was cultured were constantly migated with azochloramid solution and sulfadia mae was given orally. One patient, in addition received due oou units of penicillim. In spite of this regimen for 9 days cultures of these wounds still Yaddet the clotridium perfringens, although neither patient developed gas gangrene. This would stress the fact that chemical sterilization of a wound is practically impossible. Rosert R Biochaw ALD

8mith Petersen, M. N. Larson, C. B., and Coch ran, W.: Local Chemnotherspy with Primary Closure of Septic Wounds by Means of Drain age and Irrigation Cannulae. J. Bene Surg. 1045, 27, 563.

This article deals with a method of treating septic wounds, whereby the largest part of the wound is closed and cannulae are inserted through the superfacial structures down to the septic process. Dakin solution has been used actensively and even now its often substituted temporarily for other chemothera peutic agents. Silver pectunate solution has been used in a limited number of cases

Penncillin has been used for the last year. The tenncillin has been used for the last year. The tenning consists of primary closure of the wound around the canulae gauze sponges being packed between the skin and the flange. The dressings stabilize the canualae, A number of cubic centimeters of penicillin are delivered from the supply

bottle into the wound through the inlet cannula. The outlet cannula is left open until the clear fluid appears, then it is clamped off

Penicillin is delivered into the wound every 4 hours. The strength of the solution is 450 units per cubic centimeter. The period of administration varies from 2 to 4 weeks. Dressings are infrequent. The cannulae are removed under peniothal aines thesis and the soft tissue defects are closed leaving only a small rubber eathert in place for the administration of penicillin for a few more days. Systemic chemotherapy is used in conjunction with the local chemotherapy. The usual dosage is 100 000 units for 24 hours. Four cases are reported.

CASE 1 A boy 13 years of age had recurring osteomychtis of the left fibula. The suggested technique was followed and the wound healed com

pletely in one month

CASE 2 A man 24 years of age had recurring symptoms referable to his right ilia. Roentgenograms showed changes characteristic of cateomycli its. Operation consisted in acquestrectomy saucen zation and insertion of glass cannulae. The wound healed completely in 5 weeks.

CASE 3 man 38 years of age had theumatoid arthrits with a righd spine and fibrous antlylosis of both hips in 1934 he had had a fascia late arthroplasty of the left hip with postoperative sepsis which had persisted for a period of 5 years. During a vitallium mold arthroplasty free pur was en countered in the line fossa and treated. There has been no recurrence of sepsis for 6 years.

CASE 4. \ man 19 years of age had multiple foct of osteomyehts occurring over a period of 7 years In July 1944 acute symptoms from a new focus in the mid-shaft of the right femur developed. Operation included saucerization and insertion of 2 vital lum cannulae with wound closure. Ten months have elapsed since operation and so far there has been no local recurrence of sepsis.

The authors state that this is not a perfected method with 100 per cent cures. There have been cases with local recurrence of sepsis but these have been relatively few.

A number of figures and roentgenograms showing the method in use are included

RICHARD J BENNETT JR M.D.

Woodward, F D and Helt T: The Local Use of Penicillin J Am M Ass 1945 139 589

The local use of penicillin has proved helpful in the control of acute and subacute infections of the note, sinuses nasopharyux phary ax and mouth and has been of occasional benefit in certain cases of chronic otitis media. It has also proved beneficial postoperatively in mastoid and sinus surgery.

It has been of no value in the treatment of acute of this media, and of negligible or no value in chronic sinusities and chronic sinusities and chronic sinusities as occasiod with all lergic rhinkits.

Its usefulness in the treatment of the common

cold is still undetermined

In those cases in which the local use of penicillin has proved benedicial its effect will no doubt be en INTERNATIONAL ABSTRACT OF SURGERY

has proved beneficial, its effect will no doubt be en the combined use systematically or by hanced by its combined are systematically or by the combined use of an appropriate sulforming. The local application appropriate sulforming does not proceed to the control of the control duce any diamatic change in the incident uon present in the nose and threat. Its effect seems to present in the nose and threat.

Its energ seems to be more bacterioristic in nature than bactericitis.

be more bacterioristic in nature than nacierician. In the cases of several patients who had recently a several patients who had recently a several patients. In the cases or several patients was mad recently recovered from scarlet fewer the authors were unable recovered from scariet fever the authors were unable to after the bacterial flora on repeated cultures after local treatment

atter local freatment.

The solution 500 units per cubic centimeter and means of application. The waterholded effective and market at the solution of the waterholded effective and the solution of the market at the solution into the none at both mean of application. The watersoluble felly was nactual at times for instituation into the nose at least time and in the treatment of attophic thinlits in which the nasal symptoms were anchorated then the basis symptoms were ameliorated.

The authors are hopeful that new antiblottes will be a supported to the control of the control of

The authors are hoped in that new authorities was about the areal flat the particularly for the grain fleeting and for the more common barriers which soon be available, particularly for the grain negative organisms and for the more common bacters which organisms and for the more common bacteria when the probability of probability resistant.

Romansky M. J., and Rittman, C. E.: Penicillin Blood Levis for M. House, C. E.: Penicillin Inganuscular for M. House following a Single in Because and Fennat Ol. M. England J. M. England J. M. England J. M. England J. M.

A single injection of 300,000 Oxford units of cal A single injection of socoo Oxford units of call in peaned in a 4.8 per concern of the peaned in a 4.8 per concern of the peaned of call a few concerns of the peaned of t

about 14 hours and continues to be excreted in the carbon pendential of 3 days maintains its potential of 5 days and peanut oil of the potential of the carbon pendential o internation and room temperatures up to 37 C ingersior and room temperatures up to 37 c in addition there is no deterioration after 24 hours at 56° C or after two hours at 100 C

Cormis P. E. Jacobsen, L. Y., and Smith, E. L.:
Penicillin Bull U. S. Army Med.

The authors study deals with the serious and The authors study does with the serious and musual reactions observed in some 2 000 seddlers ancial reactions observed in some 2000 soldiers receiving prolonged course of probabilin. In about receiving protonger courses of peneum. In about of this group, the reactions were so severe that the Penicillin was discontinued. The serior that the penicipin was discontinued. The reactions are classified as follows: (1) unfortable to the following of the characteristics of the characteristi reaction are customed at 1000m (1/ introduce complicated by (a) argument extens (b) shock (c) contributions, and (d) psychotic edems (b) shock (c) and (c) are contributed as a contribute as (c) convulsions, and (d) psychotic depression (s) a syndrome similar to secum sickness (s) score syndrome (c) across syndrome syndrome similar to serum sterines (1) acute syndrome cope (3) transient miliatistice cuptions (5) error themselverschaft cuptions, at time simulating common productions and (5) error syndrome production and (5) themselvesicular eruptions, at times atmissible dermalophyticals (6) crythems nodocum and (7) epidldymitle.

The reactions to penicillin have been of two main the reactions to penicium nave been of two mean types—those appearing shortly after first exposure Open-time appearing amorny arise may exposure to the dring and those occurring at a later date as a month of an arise from the form to the orag, and those occurring at a later twite as a result of developing sensitivation. Those in the first

group are due to pre-cristing hyperscautivity to group are due to pre-cruting appendantity to pendellin which may be inherent or may occur as a result of a previous furgus disease. Those in the second group may occur latter in the first course of second group may occur later in the first come of treatment, shortly after its termination or at rettreatment, shortly siter its termination, or at van-ous time during subsequent courses. The rections is also makes and instinctions of a standard course. our times during subsequent courses the reaction in this group are indicative of a developing sensitive in a se in the group are indicative of a dereloping sensitive to penicillin. Here again, previous functions to the contract of the con tration to penicula. Here again, previous longues may enhance the development of reactive n. to peniculia.

cas to penkuin.

Both early and late reactions may be serious in notin early and late reactions may be serious in mature and require discontinuation of the theory acting and require discontinuation of the orders of the property of the proper the rascular bed.

the rescutar tood.

Antadornal testing with penicillic has been of the control of the formation of the formation of the formation. united value as an aid in disgress of state for further treatment. Increased reactivity to penicina further treatment. Increased recursts to benefine the posts of a provious acute feating.

Mease.
The presence of negative intradernal trais during the presence of negative intraormat test oming and subsception to some of the more serious reaction and subsequent to some of the more services relatives indicates that clinical judgment in such case the services of the contractions of the contractions of the contractions of the contractions of the contraction of the con indicates one curricul judgment in caca case a more important than the information obtained from JOHN E NAME ALD

Rovenstine, E. A. and Hershey S. G.; The Difference of Apomorphisms in Clinical Acceptage. The use of apomorphice as a scuative has been The use of apomorphise as a security has been imilied and it is the purpose of this report to suggest the state of the sta matter and it is too purpose or ton report to matter, one of the depressar properties more extensive use or the depressant properties of this day for several types of cortical attorisation at seen by the ancathetist

Apomorphile in substructic dotes is a valuable Aponophine in subcructe once is a value of such coordition as confined with delifian acute alcoholic psycholog, or patients and developed of impending delibing transaction and body or impending ocurring interiors, or addicts, and creditability following the use of bels

conne austous.

The hypnoide action of this drug is prompt, dependable and sale. Scientife effects become anmorning in a firm minute with the become anmorning to the sale of the sa

penseure and said sociality energy options are minutes with the reduction of market minutes with the reduction of parent in a ten minutes with the requestor or constitute of agricated minutes movements. The constitution of agriculture movements are and applications rates are cension of agricult minimum movement. In the blood pressure, pulse, and respiratory rates are constant with whatever changes may result from the climination of the state of excitement Apomorphine hydrochloride is marketed in tablet

Apumupane nyurochorue is marketed in laise. form, and is subject to Federal regulation as a narcoinc, It is relatively untable and should be decoin. It is relatively unstable and about the decaded if a Secensia there is visible when it is diluted. The sectative of Appeoble action of the drug has had been considerated in constitution. little stress in most texts. Present clinical experience shows that subspectle amounts are free from the stores that superioric amounts are the store of described based of respiratory and chronisty collapse. The drug is readily absorbed from all micross studence put its action is more certain when given parenterally

The report is based on more than 500 administra tions for the therapy of emergence delichm. It was also used as premedication for emergency operations complicated by severe excitement and acute alcohol ism, delinum tremens and severe acitation ac companying morphia addiction. Another field of mediunes was for the marked muscular and psychic overactivity occasionally seen before operation after the hypodermic injection of acopolamine or atropine.

Six case reports were given in detail illustrating the types of cases which showed response to the drug It was not given as a substitute for other de pressant drugs except in the special circumstances mentioned. Experience with the drug was limited to sargical patients. There were no accidents or un toward effects

The dose vaned from 1 to 2 mgm for the average adult patient. It was dissolved in 10 c.c of sterile normal saline solution and administered intra venously. It was safe to repeat half the amount if sedation was inadequate after 20 minutes, and the entire initial dose could be repeated should the excitement reoccur after several hours.

The drug was contraindicated when either asphysia or oxygen want seemed to be the important factor in the excitement or debrium.

MARY KARP M.D

Koppanyi, T : Acetaidehyde a Volatile Ancethetic and Sympathetic Stimulant Anesthesiology 1945, 6 603.

This report concerns the effect of acetaldehyde when administered by inhalation. The product used for the study was freshly distilled from paralde byde in the presence of sulfuric acid and water and adult dogs were the subjects. An undiluted or so per cent aqueous solution of acetaldehyde was supplied by means of a cone or towel wrapped around the nostrils and mouth. Anesthesia was established within 5 minutes, the trachea cannulated and the common carrotoid artery exposed and cannulated for recording the blood pressures.

Recovery usually occurred within an hour and was uneventful. Toxic effects of an overdose in cluded profound cardiac slowing which was in part due to central vagus stimulation and idioventricular hythm. Conventional resuccitating measures were usually successful in saving the animals.

Preliminary medication of morphine or berbitu nits reduced the quantity of acetaldehyde needed for the anesthesia. The rate and depth of respiration were increased and there was a substantial rise of the blood pressure. There were sympathetic stimu lating actions of the drug in addition to the central description of the drug in addition to the central department action, for it produced all signs and symptoms of typical thoracolumbar autonomic excitation such as pupiliary dilatation relaxation of the decidenal muscles and dilation of the bronchial musculative.

The drug is a local irritant to the skin and mucous membranes, but this action is less than that of chloroforn. Its odor may be made less offensive by the addition of various volatile oils or ammonia

water Acetaldehyde ammonia is a pressor agent and a general sympathetic stimulant, while acetaldehyde sodium bisulfite is not. The inhalation of concentrated acetaldehyde vapora is likely to produce cardiac, vascular and respiratory toric effects. Maxy Karp M.D

Thornton H. L. and Rowbotham S. Anesthesia in a Maxillofacial Surgical Unit with the British Liberation Army Anatheniology 1945 6 580

This article is based on the problems encountered and the anesthesia method employed on 1637 patients with maxillodacial injuries as encountered by one maxillosurgical unit in England during World War 2. The types of injury usually found were classified into the blow-out injury, the through and through injury to the maxilla with disorganization of the nasial passages the retained foreign body in the tongue, the brawny neck, edema of the foliotis direct involvement of the glottis and laryny and injury involving soft tissue alone.

The premedication for the average case was omnopon (gram \$\foathernightarrow{1}\) and scopolamine (gram \$1/50) given subcutaneously 1 hour before or intravenously a few minutes before the operation. The nose was occanized just prior to the injection of anesthesia and the larynx under direct vision prior to passing a tracheal tube.

Induction presented the greatest problem in this type of anesthesia because of the difficulty of placing a mask on the face. The airway was often obstructed partially or completely and there was a tendency to laryngeal spasm. Anesthesia by inhala tion was found difficult and intravenous anesthesia was the obvious alternative. A 1 per cent solution of bromethyl (avertin) in 5 per cent glucose when given intravenously produced rapid anesthesia which was highly satisfactory for intubation. The solution was warmed to blood heat and tested with Congo red before use. No laryngeal spasm or strangling was observed in any of the cases and there was early relaxation of the law.

Intubation was safely effected in the early second stage. The dosage infused varied considerably but the average case was intubated on 300 c.c. There was no cause whatsoever for anxiety regarding the safety of the drug in the cases presented, with the exception of I case which was reported in detail Death may have been due to primary heart failure.

For intibation the nasal route was most commonly chosen and the procedure was carried out under direct vision in almost all cases. The endotracheal tubes used were plasticised polyvinvlehlorid (portex). The advantages of this type over the standard rubber type were the remarkable durability of the tubes, ease of sterilization freedom from kinking reduced irritability to the laryar which permitted the lightest possible anesthesis and the unusual property of the material which enabled it to be modified to individual requirements after it had been softened by bolling

A wide-bore endotracheal connection which can INTERNATIONAL ABSTRACT OF SURGERY A wide-bore endourageness connection which can nected the tubes to the agenthesis apparatus was

eccted the those to the alreadesta apparatus was pharty in under direct vision with a 5 lock open Party nx unoer queet valon with a 3 inch open worsh bander action in liquid parafilin rather than the inflatable cuff

he inneadose cun
The technique of aneatheus used for several tipes A ne reconsque of anestocus used for several types of injuries was described. Care was taken to treat or injuries was described. (Are was taken to treat and abook and to stabilize the patient s nemorrage and soors and to stamute the patients blood presents at 100 mm of mercury or above be output pressure at 100 mm of mercury or above be for the operation was started that since was made on the aced for providing an unobstructed are mage on the accel for providing an unpostructed air way in all cases. Sometimes intubation and tracked-A 3 In all cases Sometimes incidential and traceless to the case of the case o to take care of the anoxic emergency

Pentothal Fal employed before bromethyl came Mentotal was employed before bromethyl came The technique of its use was described. into use The technique of its use was described.

The tendency to larynged span was the main described.

As the state of this agent. Although preliminary the state of the sta ORANDECK to tons agent Ulnough preliminary under local anethosis as a fourthe protransporting under social anothers at a routine pro-cedure in cases of injury to the larynx, edems of the Course in cases or unjury to the larying edems of the source principles of the longue principles of the source principles. Softra, and District Colons of the Conference of the Colons of Energy and the Conference of Energy and the Colons of Energy and the Colons of Energy and the Colons of Energy and nduction of general ancatheur, was an open ques-tion among Anorthetists deliberate trachectomy

was periormed as an emergency throughout the procedure so that the return of the constraints are sold as a small as a sma turouganut the procedure to that the return of the reflects was as Inpid as possible. The maintenance reners was as rapid as possible. The maintenance of the areathers once induction was completed with of the electronic once induction was compared was usually carried out by a closed (echnique of carbo dantify carried out by a coses technique of carros dated absorption with mixture oxide-oxygen extensions. the state of the with the Oxford vapourer enter Cyclopropane or einer with the Oxford Paporner.
Then the anestheric was terminated even effort. Hen the aperthens was terminated every effort was made to provide and maintain a rice survaition was completed. The main planting of ordinary completed and maintain a rice survaition was completed. The main planting of ordinary control was a survaint to the control of the cont tion was completed. The mass, phasynges, or oral stress, was always left in place in those patients who airus, vas airus leic in pace in those patients was did not have trachestomy. The postoperative care and are one may have transcribing. The postoperative care by the patient was of utmost importance and to or the Patient was or utmost importance and re-volved around the maintainence of a free sires. In voired abusing the maintainence of a free auray of some internet it was necessary to retain the endo-tractical table for periods of time before it was removed. The petient was placed on his side with the second of the petient was resulted in the constitution of the constitution. moved. The patient was placed on his side with the tion was always extended, until fully conscious. Suc tool was always available obstituction was avoided all circumstances and care was taken not to under at circumstances and care was taken not to acclation.

Action A short recovery period was considered essential.

As a swas individual stilled supervision until the pe

Livingston II. M (The Present Status of Ethylone The data presented concerns a general evaluation 1 the case presented concerns a general grantation of 18,750 operations done under ethylene stouthers, and the standard of the standard operations are the standard operations. of 10,150 operations come unner etnyiene anothers in the first state and ethylene-oxygen alone in major 11 500 Cases and empirencesygen assue A detailed study was made of the last J 110 coo A Uctanato Astroy Pasa Planto ou processor Astronomy Operations done under ethylene Oxygen Accurate operations come under etayiene-oxygen.
The history of the drug was described extensively
and the presum physical Physicological and phar metological teamits of its may acknowled an end not become harkware but sensitives and one became harkware but sensitives and

As to the fire and explosion hazard of the agent As to the her and explosion making or the agent reason that the drug above the agent reasons that the drug above the agent reasons are all the agent it was concurated that the drug showed the state indicate explosive quality that is present in all to innerest exposure quarry that is present in all in-balation agents except chloridom or infrom order. aktion agents except enough or nation of the author emphasized the fluct amount indeed the fluct amoun

the author emphasized the quer about more the lack of effect on the red ton of the anotheric the tack of effect on the red character of the blood of the constitution of the blood of the capitation time or combining of the blood of the capitation time or combining of the blood blood of blood combining power of the blood bood use, and identified index. The reaction to ethylene output and the state of ference men. Les reservos to empleocerren en found to be only moderate without substitution en foundation and an additional substitution of the su toung to be only moderate without supplying the second place of surfact another was simpled to the second purple of surject approaches.

The amplitude of the contraction of the sta, the amputate of the constitution of the stomach, small intestines, and often were interested and them was derived.

Monato, small incurred, and own were motivated in the control of t Restric secretion with delay in the emptying time of the stomach. Death was the to saying time of the stomach o respiratory failure before cardiac failure. Ethylene produced no spanna cause.

Ethylene produced no spanna due to direct in

Internal configuration of distributions of nistion. Electrocardiograph studies bound to condense of disturbances in cardiac submaticity of

evidence of disturbances in carriac automation of conduction. There was no market attinuation of the conduction of the c Conduction. There was no matter submutation of depression of the vagus center. Ethylene and prooepication of the vagus center

Calle gave the forest incidence of arithythmiss in There were no ancethetic deaths reported in the series

Premedication included morphine sulfate (m Atmenication included marpains single tra-octo to 00/5/ green hypodermically and extension when the ooto to oots! Even apposements and encountering then in hours before sneatheris.

A detailed tabulation was made of the 50 deaths A decision isomation was made or the 30 orange of the 1,300 operation. The which occurred following the 3 210 operations. The author believed that an excellent test of the drag author believes that an excellent test of the original made in the series reported because of the was made in the sense reported became a time former. Character of the surpoid operation per former. There was a notably low locking of the character of the surpoid operation per control of the surpoid operation per control of the surpoid operation per control operation. toring there was a notably for incorporation of the control of the ing was minimal in comparison with ether

The author concluded that chylene-organ seemed to be definitely a preferable inhalation area secure to be occurred a precessing measures again for the Pool risk Patients including these will be the pool of the patients including the patients and the patients including the patients and the patients are precessed in the patients and the patients are particularly to the patients and the patients are particularly to the patients are pati cardispulmonary mechanisms. The reported death carpagoumonary mechanisms. The reported occurs and of chylene was lover apparently than that of any other that the agent. The may drawlard of the change of the enesthetic was its deficient muscular relation for the average patient.

Flehin, G. Percelos Spinal Anesthesis Combined

titi, to I remains opinal Anceliness commonwaith Eripal Aurocata. Acts the scans 1945. The author reports 500 spins specificates with

peradue (auperatue) in 1 to 1500 dilutan combined with cripal parcosis. The method aforth ideal working conditions in abdominal surgery, without extension of the spinal snorthesis to despress agents. It is humane especially for the antion It reduces the risk of both individual petient. It provides for the immediate me of much secure to provide for the immensure use or many the because the needle is in place in the rein. It presents no complete apparatus, and it seemes a more placid awakening.

Length of spine	Percains :1500 Male Female		
56	18	6	
54	17 18	15-16	
53	17	15	
50 48 40	16	14	
48	15	13	
46	14-15	12-13	
44 43	13-14	11-11	
	13	II	
40	12	10	

The technique is described in detail One and one half cubic centimeters of tetrapon (3% solution) (amiliar to pantopon) and 10 cgm of ephedinne were given subcutaneously before operation. The patient was piaced in a lateral decubitus position and spinal tap effected. The volume of percaine given was determined by means of the above table.

The solution was injected at the rate of 4 cc. per minute. The needle was left in place in the sub arachinoid space and after from 5 to 10 minutes the height of analgesia was tested. If the analgesia was too low a supplemental dose of from 3 to 6 cc. of percaine solution was administered the needle removed, and the patient turned on his back in a horizontal position or in a few degrees of the Trendelen burp position. Infusion was then initiated and evipal sodium in a to per cent solution was injected at approximately 1 cc. per minute. The sim as a rule was to keep the patient doxing. Saline solution was administrated to maintain patiency of the needle

In pr 2 per cent of the cases the effect of the combination of drugs was considered deal 8 2 per cent were considered to have a moderate effect and o 6 per cent had a poor effect. The effect was poorest in men in the age group between 30 and 49 years and in operations above the umbilious. In 4 cases the evipal produced a mild excitation.

The dose of percaine averaged 10.4 cc in men and 17 cc. in women in operations above the umbilicus and 16 cc. and 15 o cc., respectively in operations below the umbilicus. The largest dose was 32 cc. administered to a man of 37 years for gastrectomy. The average dose of evipal was 86 cc. Twenty three patients alori satisfactorily on 3 cc. 15 on

2 c.c. and r patient even on s.c.. Complications arising from the combination were lew. The blood pressure in most cases remained constant in apite of immted usage of the Trendelen burg position. Eighth-seven per cent of the cases showed a partial fall which did not exceed 30 per cent ro.8 per cent exhibited a fall between 31 and 50 per cent and 23 per cent exhibited hypotension of over so per cent. In most cases no changes were demonstrable in the respiration and the pulse also remained unchanged. Vomiting occurred more rarely than in spinal anesthesia alone. Headache was present infrequently.

In 15 6 per cent of the cases the postoperative retention of urme exceeded 24 hours. This high percentage was considered possibly due to the wide use of morphine medication. There were 4 deaths during the first 24 hours but in no case was anesthesia con sidered a factor. One death which is perhaps ascribable to the combination anesthesia occurred before the operation was completed.

Parathesia occurred in 1 patient on the soventh day after operation it was localized to the radial side of the right thumb Pneumonia was a post operative complication in 4 cases 3 of which had a fatal outcome on the seventh ninth and eleventh days respectively

The drawbacks to the method include the some what long preparation the need for an expenenced anesthetist besides a nurse at the head of the patient and the possibility of unlateral anesthesia

The method was contraindicated in liver damage abock conditions and severe morbus cordis sepsis tuberculosis and syphilis Mary Kare M D

#### Fairclough W A. Sixth Nerve Paralysis after Spinal Analgesis Brit M J 1945 2 801

The author briefly reviews the literature concerning the occurrence of sixth nerve paralysis following spinal analgesia, and reports that in a series of 2 our spinal anesthesias 10 instances of partial paralysis were noted. Of all cranial nerve palsies following spinal analgesia, abducens paralysis constitutes well over 90 per cent of those reported. The various theories which have been advanced to account for the vulnerability of the abducens nerve are listed and all of them attribute it to the purely anatomical disadvantages of this nerve

A new theory is then suggested as to the possible cause for the frequent paralysis seen in this nerve The factors necessary in binocular stereoscopic single vision are listed and the frequency of some disturbing factor in this complex mechanism is mentioned Phylogenetically binocular vision is a recently acquired sense and presumably the first lost. The early occurrence of diplopus in unpremedicated inhalation anesthersa and in inchriation is mentioned as an example of the upsetting by a toxic substance of the normal physiological balance necessary for binocular single vision. It is pointed out that the normal power of adduction of the two eves is three times as strong as the power of abduction Lsophona is a common form of muscle imbalance. The loss of a part of the tonic impulses conveyed by the abducens nerve could then easily upset the balance and make manifest a squint that had been latent until the introduction of the spinal anesthetic. To explain why most such pareses are unilateral the author states that when the effort to maintain binocular vision is abandoned the second eve is often able to carry on monocular movements normally with the less powerful stimulus being transmitted over the abducens nerve

Ten cases of partial transient unilateral paralysis of the abducens nerve following spinal analgena (spinal percanne 1/200—from 15 to 3 c.c.) are reported with brief abstracts. Nine of the patients examined after their vision was subjectively normal had an exophona varying from 1 to 5 l D at 6

meters and none had exophoria. The diplopia appeared in from 5 to 11 days after anesthesia and pensited from 2 weeks to 14 months. Covering the affected eye gives relief but is not advised as the removal of the atimulus toward fusion and the redevelopment of binocular vision is thought to retard recovery. Dark glasses with a covering over the outer third of the glass covering the affected eye are recommended. Muscle exercises and fusion training may be found necessary in those cases in which a natural recovery is delayed.

THOMAS DODOLASS, M.D.

Engatrand, L. and Friberg, O : On the Function of the Liver as Affected by Various Operations and Anosthetics. Acts, chir scand 1045 on 5

The liver function was studied portoperatively by means of a series of tests of hippuric acid synthesis (intravenue test) in association with a number of different operations and forms of anesthesis. There was a considerable dissertation on the physiology of the liver and the methods available for the study of

its function.

The first group of experiments was made on cases subjected to high spinal anesthesis. It was shown that there was a reduction in the liver function in those cases of high spinal anesthesis (with persine) in which a fall in the blood pressure occurred. The cause was considered to be an anozemic injury to the liver.

No reduction of liver function was found with inhalation narcosis with ether a fairly great reduction was observed penisting in most cases for more than a week after the operation. In abdominal operations ther narcosis slways appeared to reduce the liver function even when there was a high glycogen content in the liver during the narcoss and when an adequate supply of oxygen was given during the anesthetic.

The reduction of the hippoints acid synthesis varied according to the magnitude of the operation. Cyclopropane was the anesthetic which was least humful to the liver even in cases showing a strong reduced liver function preparentively.

When narcotal nitrogen-monoxide (nitrous oxide)
was used with from 15 to so per cent oxygen or less
a decrease in the liver function test was maillest,
but none appeared when the oxygen administration

Was 10 per cent or over Preoperative and postoperative management with respect to the liver was discussed and the hippuric acid test evaluated. In the cases with strongly reduced liver function it was found important to treat the liver preoperatively for from five to seven days with carbohydrates and proteins, fats being excluded from the food glucose was then given subcutane ously on the morning of the operating day Cyclopropene was considered the anesthetic of choice and an abundant supply of oxygen was continued throughout the operation. Postoperatively a glucose drip was retained for from 4 to 6 days and plasma transfersion was administered in the cases with disturbances of the serum protein content. From the third postoperative day on, fat was included in the food along with a high carbohydrate diet. Although cyclopropane was the agent of choice in these cases, local anesthesia plus narcotol nitrogen monoride oxygen could be employed if adequate oxygen was administered throughout, but ether was definitely MARY KARP M.D. contraindicated.

### MISCELLANEOUS

CLINICAL ENTITIES GENERAL PHYSIO-LOGICAL CONDITIONS

Curtis, G. M., and Fertman, M. B : Blood Jodine Studies. Ann. Surg 1045

This paper is one of a series of reports on funda mental metabolic studies. The relation of the hasal metabolic rate to the blood iodine in a large variety

of thyroid diseases was investigated.

The authors conclude that the basel metabolic rate is a more reliable test of thyroid activity than is the estimation of the level of the unfractionated whole blood iodine. However they state that both determinations, considered together are superior to either one alone.

Although the basal metabolic rate is elevated in all forms of toxic golter, it is increased more in exophthalmic golter than in any other form of golter with hyperthyroidism despite a similarity in the extent of increase of the average infractionated whole blood iodine in all forms of toxic goiter

DAVID H. LYKW M.D.

VanOrdstrand H. S., Hughes, R., DeNardi, J M., and Carmody M G : Beryllium Polsoning. J Am. M An 1045, 129 1084.

A disease entity beryllium poisoning has been encountered in workers in the beryllium industry In three plants in the Cleveland area 170 workers have been affected by dermatological and/or respiratory tract manifestations of this disease. When the respiratory tract is involved the disease may progress to a syndrome resembling chemical oneu monitis. This development caused the death of JOHN J MALOROUT M.D. s workers

Schafer P W t The Etiology and Treatment of Polycythemia Rubra Vera Ann. Savg 1045

By means of proprioceptor depressor neurotomy a form of absolute polycythemia has been produced experimentally in dogs. This form of experimental polycythemia disappeared following extensive para vertebral sympathectomy Support is thus given to the theory that the normal, and some abnormal formation of red blood cells by the bone marrow is under the control of the sympathetic nervous system through its regulation of the caliber of the presinusoidal vessels of the marrow

The theory is advanced that some cases of poly cythemia rubra vers in man are due to constriction of the presingsoidal blood vessels of the bone mar row and extensive paravertebral sympathectomy is proposed as treatment for this disease. The suc cessful result of treatment of 1 man with polycy themla rubra vera by extensive paravertebral sympathectomy is then reported. SAMUEL KARW M.D.

Tyson, M. C., Vogel, P. and Rosenthal, N 1 The Value of Penicillin in the Treatment of Angranulocytosis Caused by Thiourscil. Bleef 1 Hemet., 1946 1 53

Since 1043 when Atwood found that thiogracil effectively inhibited the function of the thyroid gland, this drug has come into increasing favor in the clinical treatment of hyperthyroldism. In severe hyperthyroidism this agent reduces the basal metabolic rate and brings about clinical improvement. Of all the thyrold depressing drugs thus far tested thiournal seems to be the least toxic. However, sufficient cases have been reported to demonstrate convincingly that thiouracil may affect the bone marrow in such a manner as to induce a severe or even fatal agranulocytosis. During his preliminary experiments. Atwood noted 1 natient who had been given a relatively large dose of thionraell and developed agranulocytods. This complication has been observed with varying frequency in later sense of

The present authors believe that the use of thioursell is more dangerous than a survey of the litera ture would indicate, of 54 cases treated with the drug at Mount Sinai Hospital. New York, 6 (approx imately II per cent) developed agranulocytosis. Three additional cases of postthiouracil agranulocytoms came under the care of the authors. In spite of treatment, 4 of the o cases studied were fatal 5 patients recovered after penicillin therapy Since penicillin has no deleterious effect on the bone marrow, the authors believe that it is ideal for all cases of agranulocytosus and especially for those that may have resulted from chemotherapy with thiouracil, sulfonamide aminopyrine, or other drugs. This article calls attention to a number of import

ant concepts that may be summarized as follows 1 The cases that developed agranulocytosis had received thiouracil for at least 5 to 6 weeks before

symptoms of the complication appeared.

s In the treatment of agranulocytosis, penicillin is apparently effective in so far as it combats the bacterial invasion and toxemia, and enables the pa tient to survive until the bone marrow has regenera ted.

3 In attempting to explain why some patients de velop sensitivity to the drug and others do not, it is suggested that the cumulative effect of the drug may cause sensitivity and subsequent toxic action on the

myeloid elements of the bone marrow

4. While there is no question that under certain conditions thioursell is an excellent drug to tide a pa tient over an acute episode of thyrotoxicosis, and especially in preparation for thyroidectomy its effectiveness is present only during its administra tion. It cannot be considered as a medical cure, since it does not affect the basic difficulty of thyrotovicosis."

5- One can predict that in the future there will 5. One can predict that if the interest which be an increasing number of cases of agrandocytosis since additional courses of the drug will be given as recurrence lakes place and there will thus be an opportunity for more patients to be sensitized to the drug For this reason it would seem advisable at uture area the use of the drug only to selected present to limit the use of the drug only to selected properative cases and those in which operation is contraindicated

Kilne, B. E. Miller J. A., Rusch H.P. and Bau mann. G. A.: The Carcinogenicity of p-in methylaminosobenzene in Dieta containing methylaminosobenzene in Dieta containing the Fatty Acids of Hydrogenated Coconut Oil or of Corn Oil Caneer Res 1946 6 1

Ten groups of rats each were fed various lipids in synthetic diets containing o of per cent of synthetic diets containing o of per cent of months and months and the followed by the diets containing the followed by the followe p-unneury annuncation to these diets were then followed by a dye-free diet for

When 2 4 per cent of lauric acid or 4 7 per cent of the fatty acids of hydrogenated coconut oil were led 2 more months. no liver tumors developed within 6 months. If however these lipids were replaced by 5 per cent of where the state where the state of corn con oil, or by 4 8 per cent of the fatty acids of corn corn oil, or by 4 8 per cent of the fatty acids of corn corn oil, or by 4 8 per cent of the fatty acids of corn corn oil, or by 4 8 per cent of the fatty acids of corn corn oil, or by 4 8 per cent of the fatty acids of corn corn oil, or by 4 8 per cent of the fatty acids of corn corn oil, or by 4 8 per cent of the fatty acids of corn corn oil, or by 4 8 per cent of the fatty acids of corn corn oil, or by 4 8 per cent of the fatty acids of corn corn oil, or by 4 8 per cent oil the fatty acids of corn corn oil, or by 4 8 per cent oil the fatty acids of corn corn oil, or by 4 8 per cent oil the fatty acids of corn corn oil, or by 4 8 per cent oil the fatty acids of corn corn oil the fatty acids oil t oil the tumor incidence at 6 months was 80 and 53

The presence of 5 per cent of olive oil or 4 5 per cent of olec acid in the diet resulted in a tumor per cent respectively cent or orac scio in the orac resulted in a tumor incidence of from 33 to 53 per cent, and 87 per cent, of the incidence of from 33 to 53 per cent, and 87 per cent of the respectively at 6 months. Twenty per cent of the respectively at 6 months of added (as a devaluated home respectively). rats fed on a dlet free of added fats developed hepa

## The Surgical Problem of Cancer tomas within this time in the Lymph Nodes. Sergery 1945 18 608. Sugarbaker E.D

This article deals with the problem of the treat ment of cancer in the lymph nodes in an attempt to determine how such treatment may be developed to marimum advantage. Considerable divergence of opinion prevails concerning the ideal plan of treat ment of occult cancer in the lymph nodes. Thera pentic dissection conveys the idea that the size and character of the nodes indicates lymph node involvement. Prophylactic disaction implies that the nodes are suspected of containing cardinoms cells despite the absence of physical aigns of node involvewelfare the ansence of physical signs of node involved ment. It is apparent that in both instances errors that in soft ment will occur There is a wide variation in the terror of the te the frequency with which different tumors metastakize to the lymph nodes Different sites of pri mary involvement and quantitative differences in the lymphatic systems of the parts, the size of the lesion, whether the tumor is primary or recurrent, the nature of previous treatment, and the duration of symptoms must all be taken into consideration. The node incidence in some of the commoner tumors

Another consideration not discussed in the litera the but which seems to be pertinent to the problem is given in Table I relates to quantitative node involvement in dissection specimens from the various tumors and the

# TABLE I THE NODE INCIDENCE OF CANCER

TABLE I THE NODE INCIDE	10
TABLE 1 111	12 to 15
4 m¥	18 65 55
Carcinoma, intrinsic larynx	
Cardnoma, mo	31
Carcinoma, skin Carcinoma, penis	35
	49
Carcinoma, lip Carcinoma, lower gingiva.	46
Carcinoma, lip Carcinoma, lower gingwa. Carcinoma, buccal mucosa	63
Carcinomas buccal mucos	ւ ն
Carcinoma, tower ging. Carcinoma, buccal mucosa Carcinoma, vulva Carcinoma, tongue and floor of mout	h 64 68 70 70 75
Carcinoma tongue and most	=0
Carcinoma, akin	5
Melanoma, akin	10
Melanoma, rectum Carcinoma, colon	75
Carcinoma, colon Carcinoma, extrinsic larynx Carcinoma, extrinsic larynx	75
Carolinorna, extrata	77 80
Carcinoma, stomach Carcinoma, breast	50
Carcinoma, breast	
Carcification tomali	
Carcinoma, torsil in Carcinoma, nasopharynx Carcinoma, nasopharynx	widespread metastases
in Carcinoma, many	idespread an of node
of which	- are number of a per

relative frequency with which widespread metastases occur. A table showing the average number of nodes involved for different types of cases and the per centage of cases with more than one node involved able that if a given tumor metastasizes with regu is presented in the original article. ance that it is given tumor inclusionaixes with resultantity to only one or two nodes, remains confined there after all clinical doubt as to its presence has there after all clinical doubt as to its presence has been dispelled and very farely kills by reason of been dispelled and very farely kills by reason of been overly farely kills by reason as the control of the such a tunor more such as the control of the such as the such night as well be treated by a dissection done thera petitically instead of prophylactically Conversely, pourceasy unices of prophysicically to the local nodes before its presence becomes dialog. nodes before its presence becomes clinically apparent, is found to involve numerous nodes of the specimens examined and not infrequently brings about death examineu ann nor inirequently brings about death by distant spread, dissection must be carried out prophylactically it it is to be of any use at all. Therefore it is someoned these the modules is Therefore it is apparent that the problem is con certed not only with how frequently regional nodes cemen not only when now requestly the disease is are involved but also with how rapidly the disease is are involved out also with now rapinity the disease is apt to spread beyond the limits of the removable chain

In many instances the anatomy is so adaptable that removal of the primary tumor with the regional nodes becomes little more of a task than removal of nodes occumes intue more of a rask inan removal of the primary tumor alone. This is true of the stomach, bored, and lungs. The question of node dissection therefore pertains mainly to those tumors in which the primary and node area are best treated sepa rately either at one sitting or in stages. Considera tion must be given to the relative value of the several major dissections - cervical axillary and inguinalbased on the anatomy peculiar to each and the way they lend themselves to node dissection. One must uney remu mensueves to some unsecured. One must also consider the added risk of prophylactic node also consider the added risk of prophylactic node also consider the added risk of prophylactic node. dissection in poor risk patients in the cancer age

In the surgery of cancer there are in general, two in the surgery of cancer there are in general, which major problems (1) the degree of radicalty required major problems and (2) the degree of radicalty which by the tumor and (3) the degree of radicalty which the major and deleters of the control of the case the patient will withstand. Overestimation of the first and underestimation of the second will result in too high a percentage of postoperative fatalities. The c n terse will result in too low a percentage of cured ca co Contraindications to therapeutic and proj hylactic node di section are presented as well as the arguments for and arginst prophylactic dissection in cancer of the I p JOHN L. LINDOCEST M.D.

# GENERAL BACTERIAL, PROTOZOAN AND

## PARASITIC INFECTIONS Pridemiology Unit Number 22 Sulfadiazine Prophylazis and Resistant Streptococci J Am II

A previous article has described the pronounced reduction of streptococcic disease which occurred at a large naval training center in the Northwest as th result of sulfadiazine prophylaxis The present report deals with the loss of effectiveness of this prophylaxis due to the appearance of sulfadiazine

Viter approximately 3 months of successful sulfa re utant strains diazin prophylaxis of respiratory infections at a large naval training center the effects eners of this m a ure became progressively less and e entually a major epidemic of streptococcie duease occurred

An increase in dorage to as high as a gm. daily d I not prevent streptococcic diseases and it was the impression of medical officers at the center that the drug had lost its value therapeutically in these

The loss of prophylactic alue of sulfadiarine wa originally associated with an absolute and relative increase in the frequency of group, 1 type 10 in fects as to the practical exclusion of all other types. Later group A type 17 became relatively frequent. These two types were shown by laborat 1) methods

to be sulfonamide resistant in vitro Other types I streptococca with a few exceptions

of type 3 were not sulfonamide resistant The proportion of sulfadiazine resistant strains

was greater in those recruit camps getting sulfadiazine prophyla ; than in those not getting sulfa

There was som suggestive evidence but no defi aite proof that a the presence of sulfadiazine re istant strains sulfadiazine prophylaxis tended to nerease the strept scoccic infections particularly scarlet fever

# DUCTLESS GLANDS

# Shipley E. G. and Rannefeld A. N. Glucose Tol erance in Rata following Repeated Small Doses of Alloxen Full concepts 045-37-313

The article I al with purely laborat ty research of charge 1 range aft respected small diver of allocan. It has been shown conclusively that a nele injection fa large dose of allocan (from 200 nele injection fa large dose of allocan (from 200 to 400 mgm kgm 1 admini tered subsutaneous produced severe and permanent diabetes in rat with necrois of the beta cells in the pancreatic islet (Dunn Sheehan and McLetchic 1913 Golfner an I

Clarke Intravers us inject wis ! Irom 60 to 75 mgm -kgm produced equally & en Gomori 1913) diabetes in rate (Shipley and Meyer unpul), of

The effect of small repeated down ( all tan 2 the functional capacity of the felet 1 a 15 m 1 5 datal certain The authors quote the literature on the particular phase of this research and km and then give their i rocedure of injecting small & set of alloxan in definite control groups of rate. They then discuss their results and give tables should be They have reached the I llowing con

Rats given 14 subdiabetorense doses el albra ocei a herior of a mere a did not pecome phoenic cemic on a normal diet but showed impaired text

The decrease in tolerance to glucose appeare ! t ance to administered glucose be permanent since it remained ( r 23) a weeks aft r

In a second group of rats there was a marked a cessation of the alloxan treatment

progressi e decreace in glucose tolerance ali r rach injection of a 25 mgm kgm, dose of all man. The decrease in glucose t lerance was shown by t bigher blood glucose levels reached early in the test and in the slower return of the glucose level t

It was concluded that 25 mgm./kgm. dives el allozan given intravenously produced a progressive damage to the pancreate tiets in rat and that even a small amount of damage was not f limed

Extract from the anterior pitultary lobe a im by compensatory reaction. stered t 4 rats with impaired glucose t learner produced hyperglycemia after 11 days in 3 of th anımalı

# Untar G : Endocrine Function of the Spicen and ar O : Endocrine runction of the ordered and lis Participation in the Pirultary Lifensi Response to Stress. Frdorino 67 1945 37 J.

The post ibility of the spleen a function a st a endocrine organ has been suspected fra her tree Extensive reviews of the problem by Lauda 1 1031 and by Perla and Marmorston in 1915 showed, but ever that in spite I a great deal of circumstactual evidence there was no allol proof of an interna-secretion of the sphere. The last to years d. pc. seem to have brought! reard any lecisi e fact a it may be a sumed that the results reported in the article con titute the first experimental evalence that the filten produces and can rel ace int it circulation a substance acting like a hormoalso shown that this function of the aftern is u.s. the control of the pituitary gland an i the a lerral cortes. The significance of the internal secretical the st leen is not yet quite clear bot all the Lata by the conclu on that it is preduced in care! emergency and its main acti a is on the pro-

The author describes he meth I fattach r! research problem and gives the realits of en metabol m. tespone to it sue injury hemotilage stanat and drug actions. The results of these suggested and drug actions. The results of these suggested that under the influence of certain stimuli a reaction that under the inhumence of certain summin a reaction took place involving the pituliary the advantage tex and the spleen. The question then was whether took place involving the pitting of the agreement core and the spleen. The question then was whether the spleen played its part by releasing the active substance or by causing some other reaction. A crude extract of guines pig spleen in saline solution Mas bichaicq and injected subcutaneously in order to study its effect on the bleeding time of guines The mode of action of the spleen was studied pies and found to have the following effects (1) it re duced the bleeding time (a) it increased the capil lary reassance and (5) it inhibited the histamine release from the blood cells. The author summarizes his observations and concludes as follows

in the course of a study of the pitultary adrenal reaction to stress this response was found to be in hibited by splenectomy It was also observed that spleen extracts contain an active substance which can reproduce the reaction to the original stimulus This active substance was isolated and obtained in and active aurosence was movated and voicemen in pure crystalline form. It is probably part of the bute craverance system which protects proteins against trypsin The sphen as an endocrine organ may therefore play a part in the control of protein me labolism and its adjustment to conditions of stress.

# SURGICAL PATHOLOGY AND DIAGNOSIS

Bowden R. E. M. and Gutmann E. The Clinical Value of Muscle Blopsies. Lancet Lond 1945

The authors note that there are several medical and surgical conditions in which examination of buonsy specimens of muscle is helpful or even es sential in the establishment of a diagnosis but until recently this method has been largely neglected in the investigation of neuromuscular disorders certain cases of paralysis associated with vascular lesions, the value of muscle biopsies was demon arrated In peripheral nerve injuries they have yielded information which has been of great as 1st ance in diagnosis prognosis, and treatment. In northypus of gradual onset it may sometimes be difficult to determine whether the lesion is primarily neurogenic or myogenic and in such cases even electrical reactions and electromyography some times do not give decisive information Bealdes Elv ing information about the state of the muscle fibers a muscle biops) is a form of nerve biopsy in that a museue outpay is a torin of nerve index in con-nerve fibers empty. Schwann tubes or motor end plates are almost always found among the muscle

The authors state that the purpose of this article is to indicate the value of muscle biopses in the diagnosis, prognosis, and treatment of neuromuscu pbers lar disorders. Four types of cases have been investi gated (1) lower motor neurone lesions due to pen pheral nerve injunes (2) lower motor neurone exions other than peripheral nerve injuries, (3) pri mary muscular disorders and (4) vascular lesione,

Some illustrative cases are described and summaries given of the indications for performing biopsies the methods of treating specimens and the findings.

The indications for performing a muscle biops)

To determine the state of muscles in which may be summarized as follows atrophy is advanced or in which a vascular lesion is suspected and if the latter is found to assess the outpeaced and a me latter to roughly to assess the type and severity of the lesion. Surgical repair of nerves or long continued physical treatment is valueless if the muscles have been irreparably damaged To aid in the diagnosis of the type of Icsion in the nerve and to determine whether satisfactory regeneration is taking place in partial or recovering

3 To differentiate between paralysis of myogenic lenons

origin and disease of the lower motor neurone. Note that amount actions of the use of blop-

ses in certain cases of poliomyclitis as detailed by the authors

A method of muscle biopsy is presented histological findings that are found typical of the instance and that have been investigated and have types of cases may need my confidence and mayor been reported herewith are described. In their dis cusions of the effect of vascular lesions the authors cussions or the energy of vascular results the that there is still a difference of opinion about the mechanism underlying vascular lesions of muscle, but from experimental and clinical observations it is our none experimental and others of lesions must be evident that two main types of lesions must be recognized (1) those due to interruption of the ar terial supply and (2) those following venous ob terial supply and (2) those sources we struction of the struction. A sudden complete obstruction of the struction. A success of the muscle fibers. If the lesion is the result of venous obstruction the picture teams is the result of venous obstitution in the picture. is one of dense horous ussue productation but there is no clear cut boundary and there is extensive infiltration throughout the affected area. Clearly, infiltration throughout the silected area.

infiltration throughout the silected area.

in either type of lesion there is a poor prospect of in either type of lesion there is a poor prospect of infiltration throughout the silected area. recovery if the changes are widespread recuvery it the changes are mucespicus cular lesions are complicated by degenerative lesions curar resions are complicated by the prognosts is of the nerve trunks. In such cases, the prognosts is

threally the limitations of muscle biopsy are presented. It is noted that a biopsy specimen is a small much less favorable sample Furthermore, a biopsy specimen may con sample ruttnermore, a only a precimen may contain no nerve elements. Sufficient time must clapse for regeneration of nerve fibers if biopsy is to be used to determine whether this broces is brokersing to determine whether the property with a nerve lesion is at a high When a nerve lesion is at a high level it may not be justifiable to wait for biopay before proceeding to direct exploration of the nerve

# EXPERIMENTAL SURGERY

Duguid J P . The Numbers and the Sites of Origin of the Droplets Expelled during Expiratory
Activities. Idisburgh 1 1945 52 385

The number of droplets expelled during normal the number of displace appraison laughing speak breathing strong nasal expiration laughing speak ing coughing and sneezing has been estimated by four different methods

7 Counting the colonies on culture plates exposed recuy to the droplet stain marks on slutes ex 2 Counting the droplet stain marks on sizes ex-posed directly to the droplet spray. This gives number of all droplets larger than about so increase directly to the droplet spray

Counting the colonies on culture plates exposed 3 Counting the colonies on culture plates exposed in the Bourdillon all samples The sives the num. in diameter

in the Hourding sill sampler This gives the name bers of bacteris carrying droplets small enumbles of bacteris carrying droplets small enumbles of bacteris under about 100 microns) to (with initial diameters under about 100 microns) to counting all microscopically valide droplet remain air borne as droplet nuclei.

Counting all microscopically value droplet in the all muchel found on oiled slides exposed in the all nuclei tound on ones more exposed in use my sampler the nuclei being colored by dye previously sampler the nuclei being colored by dye previously sampler the nuclei being colored by dye previously that the sampler the nuclei being colored by the nuclei sample sample. taken into the mouth This new method fives the numbers of droplets with initial diameters between numbers of droplets with initial diameters occurred about 1 and 100 micross and these counts are soons I and 100 microns and these counts are considerably greater than the counts obtained by any other meahant considerably freater than the counts obtained by any other method. The numbers of droubts origin.

any other method. The numbers of cropics origin at the from the pose and throat were estimated in ating from the nose and threat were estimated in tests with becilius prodictions inoculated as an indicator on to one of the sites.

dicator on to one of the sites.

No droplets were found to be expelled by normal No aropiets were found to be expeated by normal mouth breathing for a 1 minute period. Normal mouth breathing for a 1 minute period. moun presting for a 1 minute period. Normal move breathing for a 5 minute period sometimes produced a not produced as 3 droplets, and sometimes produced as 3 droplets, and sometimes produced a not produced as 3 droplets, and 3 droplets, and 4 droplets are stated as a second as a se not produce any dropiets, and sometimes produced a few these dropiets were found to originate in the new the droppers were found to originate in the near A single strong massl expiration produced from the fore the forest the fore

nose. A single strong nassi expiration produced from a few to a few handred droplets some of these were the change to form droplet mucle.

Laughing for a one minute period sometimes did

a sometimes of a one minute period sometimes did

a sometimes of a one minute period sometimes did

a sometimes of a one minute period sometimes did

a sometimes of a one of the control of the small enough to form droplet micked

Laurence for a one minute period sometimes during the produce any droplets and sometimes produced a for Produce and any area of the produced and area of the produce me produce any couplets am sometimes in few these originated in the faucial region. w these originated in the saucial region.

To these originated in the saucial region to a few counting softly produced from a few counting softly produced from a few counting softly produced from the few counting softly pr Counting soily produced from a few to a few dozen droplets counting issuity produced from a few dozen droplets counting issuity produced from a few hundred these apparents. tew dozen to a tew hundred these apparently originated in the front of the month and were small

enough to form droplet nuclei. Saying too K. enough to form droplet nuclei. Saying 100 K a loudly sometimes produced a few dozen or a lew entury sometimes produced a tex unsert or a tex numerica uropiers many or unsee organized in the faucht region, and a few of the faucht droplets were

A single cough with the mouth kept well open, small enough to form droplet nucled. an single confin with the many droplets par some someunes are not produce any grophets, out some times produced a few dozen or a few hundred. Many of these originated in the landal region, and a few or these originates in the landau region, and a region of the desired trouble to form droubly to death. A single were small enough to form droubly to death, and the second of the landau and the landau and the second of were small enough to form droppet flucies. A single cough with the mouth initially closed, produced cough with the mount initially closed produced from a few hundred to many thousand droplet these originated in the front of the mouth and were

and choose to their arches produced from a lew small enough to form droplet naded. a surge matures surges produced from a free bundred thousand to a few million droubts, these hundred thousand to a few million droplets these apparently originated in the most in this apparently originated in the distribution of the most in most in the way of the most in the most were small enough to horn droplet, nuclei, in most success, between a few and a few thousand droplets, many the state of t success, perween a rew and a rew unousand droplets were found to originate point from the bose and from the fracial region.

call enough to form dropper name.
Thus, speaking coughing, and meeting produce. small enough to form droplet nuclei. rhus, speaking conguing and success procure many droplets small emough to trees assail droplet nuclei. Nearly all of these small droplets are all the state of th orquet nuclei. Nearly all of these small droplet, of the month, the extent of the month, the categories in the front of the month, the manufactured has the house in fourth months and have the months and have the months of the house in fourth house in fourth months. originate in the front of the mouth. The extent of the mouth of the mo air borne internol which may be produced by the droplet spray of infected persons, intercore, mich which the depend farriby upon the frequency with which are the constant of orband sargery upon the irrepressor with which plants of present in the secretions of pathograde organisms are present in the secretions of the sargery matter mouth. This frequency does not specific the sargery matter than mouth 1 ms trequency ones muse syres.
The hazard of air infection with dropto be great. The hazard of air intection with order lets originating in the nose or threat, where pathons or originating in the nose or threat, where pathons or the nose of t ets originaling in the mose or throat, where jeaning sente originaling are often present in real numbers sente originations are often present in season and the sentence of the present in the sentence of the present in the sentence of the present in the sentence of the s senic organisms are often present in great nimore; it inflicted by the small amount of attorization which

is minuted by the small survey of these alter.

# SURGERY

# GYNECOLOGY AND OBSTETRICS

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# A DISCUSSION OF CONTROVERSIAL POINTS IN AMPUTATION SURGERY

# FRANCIS M MckEEVER M.D. Battle Creek, Michigan

THERE is great difference of opinion between surgeons concerning the various procedures of amputation Some disagree concerning only minor variations in technique or un important matters of personal preference others differ in matters of basic importance In time of war because amputation is fre quently necessary after severe injuries from high velocity missiles great experience is

At Percy Jones General Hospital in the 33 gained in this field of surgery month period from January 1943 to October 1945 the amputation service has cared for 2 783 patients with major amputations This is a greater number of amputees than was cared for by the entire Medical Department of the United States Army during World War I which produced only 2 635 amputees These 2 783 patients had a total of 2 988 am putated extremities. The incidence of ampu tation per patient and the location of the extremities which were lost are presented in

As a result of this experience many procedures and techniques of amputation surgery Table I which are controversial have been observed Observation of this group of patients has established that certain methods have a defi nite value while others give less favorable results.

OPEN CIRCULAR AMPUTATION

In the United States Army Medical Corps the open circular amputation or as it is more commonly and less accurately termed guillotine amputation was mandatory in all instances of amputation for trauma in forward installations In this type open operation the skin is cut circularly at the lowest level of good tissue and allowed to retract. The fascia is then incised at the line of skin retraction and the superficial muscles are sectioned and allowed to retract The deeper muscles are then sectioned at the line of retraction of the superficial muscles and allowed to retract. The bone is then cut through at the line of nuscle retraction The leg is not chopped off as if by a clearer Thus procedure carried out TABLE 1 —AMPUTATIONS IN 2783 PATIENTS

11 0) TIONS	3 124 21-0	Per cent
- AMPULATION	Cases	
TABLE I —AMPUTATIONS	2584	93
Ylm usi	194	14
extremity	4	03
Loss of extremity only Loss of a extremities Loss of 3 extremities Loss of 4 extremit es	1	
Loss of 3 extremit es		
3 Loss of 3 extremit es 4 Loss of 4 extremit es SITE OF AL	IPUTATION	Per cent
SHE	Na.	02
(85° )	7	35 0
Lower extremity  Hp disarticulation	049	49 8
Lower dearticulation	1487	٦,
In P Late		
2 Too knee		6 7 6 8
15 3 Below knee  15 15 Upper extrem ty—(5%)	203	6.8
	243	
fi Upper extra elbow		
Below elbow		
1 Best a		

correctly produces a potentially inverted cone when traction is applied to the skin but leaves no flaps to trap infection. If the patient is given proper postoperative care the essential of which is traction the stump is usually ready for definitive surgery in 8 weeks. If constant traction is not applied muscles retract and a large section of bone protrudes from the end of the stump (Figs. 1 to 4).

The flap type of open operation in which overhanging duck bill flaps are produced was forbidden in the American Army forward hospitals. The British Army permitted its surgeons to do the so called flap guillotine operation as they deemed it advisable. Many American surgeons both in military and civilian practice have taken exception to the absolute deletion of the flap type operation in forward hospitals and there has been con siderable heated debate around this point. It was claimed that it was out of the question to keep traction on the open circular amputation. and that stumps resulting from this type of open operation would arrive in poor condition in the Zone of the Interior This objection was not valid. In 3 years and in 2 783 pa tients with 2 988 stumps there were 30 stumps, or 1 per cent, which had not had the proper postoperative care by the time they arrived at this Midwestern hospital Many of these patients arrived at the Zone of Interior hospital with effective traction still on the stump having crossed half of Europe the Atlantic or Pacific Ocean and half of this country with very ingenious combinations of adhesive tape plaster and elastic bands to keep the skin from retracting

The only valid arguments for the flap type of open operation are (1) time, (2) the avoid ance of a second operation. The argument of time is valid in that if the immediate convolvescence is not complicated by severe sepsis, early secondary closure is possible. In some instances after the first 10 days to 2 weeks the flaps can be permitted to fall together and be loosely sutured thus obtaining a closed stump soon after the injury. The second point is not a valid argument in very many instances. A high percentage of amputation stumps resulting from the secondary closure of inaccurately cut flaps will be poor stumps, with

too much redundant skin and muscle at their ends. This condition will require a late secondary operative procedure to produce the ideal stump. A young vigorous man is going to and must, use his prosthesis hard. He cannot get by with a poorly teilored stump. For the aged individual who will probably use a prosthesis very occasionally and in whom the avoidance of surgical incidents is desirable, the flap type open operation may have added ment. For the young in whom perfection of stump is desired the open circular amputation is believed superior as in this method a late definitive operation is an accepted fact.

In amputations done for trauma, the danger of ever present infection becoming invasive and virulent is reduced to an absolute minimum by the perfect drainage afforded by the open circular operation. The definitive surgery to complete the closure of an open circular amputation is in effect a late sec ondary wound closure. Whether it be accomplished by plastic closure or by reamputation at site of election it is associated with very little danger. In carrying out the definitive or final operation in 2 088 stumps in 2 783 patients who had had an open circular amputation a severe recrudescence of infection in the amputated extremity as manifested by cellulitis abscess, high febrile reaction and general sepsis, occurred in only 20 instances, or o 66 per cent. No patient died as a result of the definitive surgery on the guillotine stump.

Five per cent of patients had some complication of their final surgery. The common complications were a mildly infected hematoms in the stump without systemic reaction or a marginal skin necrosis which required a minor skin plastic later. Most of the patients with the complication of hematoma on its evacuation after the removal of a few stitches recovered with a satisfactory stump and without further surgers.

The severe infections resulting from secondary closure or reamputation occurred many times where they were least anticipated Some were in a stump which had been conpletely headed for many months or had been covered by a skin graft for many months. Other stumps which had more than a reason able amount of granulation tissue at their

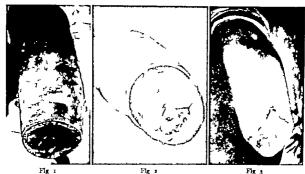


Fig 1 Fig 2 Fig 5 Fig 1 Open circular amputation, immediately post operative.

Fig a. Open circular below knee amputation 8 weeks postoperative. Turned back stockmette is for skin traction. As result of continuous traction, this stump is now ready

end at the time of surgical revision convalesced with no reaction. The only inference to draw from this is that regardless of how nearly normal the condition of previously infected tissues may appear it is never free of bacteria and those bacteria may become rampant at any time.

All patients received for 48 hours prior to surgery either sulfonamides or penicillin systemically They also received one or the other of these antibiotics for as long post operatively as was indicated by their general condition or the local condition of the opera tive site. Sulfadiazine was the sulfonamide used About 1 800 patients received sulfadia zine and 1000 penicillin. The patients pre ferred sulfadiazine to escape being punctured with a needle One seemed about as effective as the other in this type of surgery and a positive stand for either to the exclusion of the other was impossible. One or the other how ever should be used In 500 operations sulfonamides were used topically in the stump Late in 1943 the topical use of sulfa nilamides was discontinued Since discon continuing the topical use of sulfonamides, the stumps healed better with less reaction and less hematoma.

Fig. 3

f. intel operation. Skin is pulled well down over end of stump which is healed by soar contracture.

Fig. 3 Below knee atump which has not had traction postoperatively. Skin has retracted and 5 centimeters of bone protrudes, which will have to be sacrificed.

#### TECHNIQUE OF AMPUTATION

Opinion differs greatly regarding the actual technical steps of performing an amputation As one reads surgical treatises on this subject

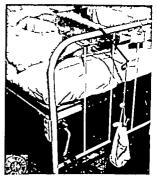


Fig 4. Method of applying skin traction to open circular amputation. The stockinette is glued to the skin before patient leaves the operating table and traction is started immediately.



Fig. 5. a, left, Anteroposterior view b, Lateral view Good tapered below knee stump. Skin, nonadherent no bulbous muscle over end to bony prominences no super field neuromes.

the impression cannot be escaped that much has been carried through the years from book to book which does not hold in the light of present physiological and pathological fact.

The surgical technique of amputation should aim to produce a stump which has soft flexible nonadherent skin and which has no redundant muscle. There should result no projecting bony prominences and the neuromas of all nerves should be well covered and not subject to pressure.

In order to avoid adherent skin dissection of the skin flap in the subcutaneous plane must be avoided as much as possible. A certain amount of freeing of the skin to effect a smooth closure is necessary but this rarely needs to exceed 3 centimeters from the skin flap is distallent As nearly as possible the skin should be left attached to the factor.

Wherever possible fascia should be closed over the bone end. In many instances of secondary closure this is impossible. Either fascia and skin or skin alone should be the only covering of the bone end Muscle should never be used to cover the bone end as it results in a redundant unattached sliding mass at the end of the stump which shrinks very slowly and ultimately turns to scarred avascular tusue. All muscle should be coned out at least perpendicular to the bone end and pref erably with its periphery slightly proximal to the bone end. Even in the avascular stump the presence of excess muscle in no way aids the skin circulation, as there are no perforating arteries between muscle and skin

Some controversy exists relative to the treatment of the bone end Apenosteal technique has for years been advocated. By this is meant the removal of a cuff of perioteum about the periphery of the end of the bone The cuff is variously recommended to be a quarter to one half inch in width. This procedure does not seem a logical one as it deprives the underlying bone of a certain amount of blood supply In the presence of any sepsus it will in a high percentage of patients, result in a ring sequestrum. The procedure is therefore contraindicated in any secondary closure or secondary reamputation. or in any patient in whom there is any chance of an infected hematoms. Even in the absence of all infection in some instances a ring sequestrum will form because of the avascular necrosis of the bone end, which has been denrived of permsteum.

The periosteum should be incused cleanly at the saw line and at the completion of the box section the periosteum should be adherent to the end of the bone about its entire dreumference. The only reason for the removal of any periosteum from the bone end is that the handling of this membrane has been faulty and rough, thus necessitating the removal of

tags stripped loose

Hemostasis is of utmost importance to the end result of an amoutation. Time should be spent tying all small muscle bleeders indi-The development of a moderate vidually hematoma may delay recovery many weeks and even necessitate further surgery avoid the collection of blood even after careful hemostasis, it is well to drain the stump with a small rubber drain for 48 hours. Many amputations are done under spinal anesthesia, and a reduced blood pressure may lead the surgeon to a false evaluation of bemostasis. It is well to know the patient s arterial tension before the wound is closed and if it is 20 to 30 millimeters below his preoperative pressure, to have it raised to normal by an injection of ephedrine before the flaps are closed. This will often make what appeared a dry field bleed profusely

No point in surgical technique has caused as much debate as the method of treatment of the nerve end. This debate has undoubtedly

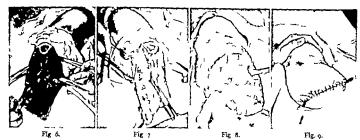


Fig. 6. Technique of below knee amputation, skin not lifted off fascia, tibia tapered with periosteum adherent to end, nerves cut high in fascial plane

Fig. 7 Technique of below knee amputation, muscle coned out so that only fascia and skin remain to go ove bone end.

resulted from the distressing sequela of 'phan tom limb Many chemicals have been advocated for injection into the nerve to prevent neuromas. The time honored method of alcohol injection has had a long period of usage. British authorities have in recent years advocated the use of formalin as a neurotoxic injection. A Russian school has advocated the cauterization of the artery of the nerve proximal to its distal end. Duck bill closures have been described. More recently a method of burying the nerve end in the medullary canal of the bone was described (Firs. 6 to o)

It is well established that there is no chemical which will prevent the end of the cut nerve from healing by neuroma formation. I am unable to comment on the Russian method of depriving the tip end of the nerve of blood supply but believe it only places the neuromal more proximally. The recently advised method of burying the nerve ends in the medullary canal of the bone is open to great objection if the nerve crosses a joint in the stump as it could easily lead to a nerve put under traction in many motions of the extremity.

For the past 3 years in the Amputation Service at Percy Jones Hospital none of these methods has been used. In fact little or nothing has been done to the nerves in an amputation stump except to treat them with

Fig 8 Technique of below knee amputation. Fascia closed over end, drain placed beneath fascia excess skin is removed so that in actual closure, very little skin is separated from fascial layer

Fig 0. Technique of below knee amputation. Skin closed without redundancy Drain in angle of skin closure

respect and to hide their ends. The nerve should not be forcefully stretched so that it can be cut off high and then allowed to re tract so that it will return to its normal length rather the nerve trunk should be dissected and cut off high so that the neurona which will nevitably result in the natural healing of the nerve end is well recessed in muscle. If a large bleeding vessel is present in the nerve this should be heated.

#### PHANTOM LIMB SYNDROME

In 2 988 amputations there have occurred 15 neuromas which required surgical removal and these could probably have been avoided had the surgeon been a little more thorough in the original operation. The only indication for the surgical removal of a neuroma is a superficial location which would cause it to be subjected to pressure thus producing pain. This pressure may come either from the prosthesis or as a result of the bare stump resting on or striking a hard surface and can be demonstrated by palpating and tapping the neuroma, which will produce a shock like sensation moval of neuromas for the treatment of any phase of the 'painful phantom limb syn drome will result in failure

In this group of 2 783 patients 4 instances of painful phantom limb syndrome have occurred Undoubtedly more instances of this distressing complication will occur in this group of patients as the years go on A certain degree of phantom limb sensation seems to be almost physiological and this fact should be appreciated

Every individual with an amputation has a phantom limb Rarely does an individual with an amputation have a 'painful phantom limb This phantom sensation has a fairly uniform life history. It is present as a complaint in the days immediately following amputation and is usually more severe when the amputation has resulted from crushing trauma or is accompanied by great suppure

As healing progresses and inflammation and induration recede the patient complains less of the phantom pain. He will tell you that he has the foot or hand but that it does not bother him. After the phantom has lessened and the patient has learned to live with it, any surgical procedure on the stump will aggravate the phantom phenomenon temporarily. This fact is true even though the surgical procedure in no way involves the nerve end. In many instances a simple excision of a skin scar in this group of patients resulted in an exacerbation of phantom pains. As healing again ensued the disagreeable aspect of the phantom subsided

When the patient puts on a prosthesis and uses it successfully the phantom phenomenon rapidly assumes a less prominent place in his scheme of life. In fact many patients will proffer the information that the phantom is a help to them. It gives them some inkling of where their foot or hand is and what position it is assuming. This is the ordinary history of

the phantom phenomenon
The rare individual with the abnormal per
sistent painful phantom limb must be
distinguished from the common group who
have the normal residual. Although rure this
type of patient is not hard to distinguish.
Many times the distinction can be made by
the patient's scars. Too often such a patient
presents scars of removal of neuromas and
section of nerve trunks at various levels in the
stump. At the base of the extremity the scar
of a sunglical attack on the sympathetic.

nervous system may be present. In addition to these scars he may also present the pig mented marks of the morphine needle. The cure of a truly painful phantom limb by any surgery is extremely dublous. Certailly there is no basis for excession of neuromas or penheral nerve section in the treatment of this complication of amputation and sympathetic interruption does not have any great number of successes to recommend it. Whether the newly advised operations attacking the cre-ball cortex will now of value is not known.

bral cortex will prove of value is not known. Probably the only successful treatment of this problem is its prevention. Unfortunately this cannot always be done by the surgeon as it is impossible for him to control the environment of his patients. However in the early management of an amoutee he can use nar cotics judiciously and take all surgical mea sures to reduce and shorten extensive suppuration and tissue necrosis. It is almost universal that the picture of painful phantom limb is associated with the use of morphine or alcohol and with the poor adjustment of an individual to his environment. No surgery devised to date offers a cure for these un fortunates.

The following case history is illustrative of the complex nature of these patients.

A paratrooper lost his right arm in combat. He was a wary little individual who had a great record for valor. His arm was knocked off by an 88 millimeter shell and a companion applied a tourniquet. Following this he continued in combat for the next few hours until he was wounded in the thigh

On admession to a bosp tall in the United States be was cheerful, hard to keep track of and was all over the building. He had no complaints about his arm the always seemed to enjoy talking about combat and his personal emploits. His amputation stump was revised and he was fitted with an artificial limb, which he used with great deviently depute a very short tump.

After using his prosthesis for about 6 weeks he announced that he was returning to duty with the paratroops. This was most onusual but it seemed that while on vacation from the hospital he had good to a paratroop base where he contacted some commanding officer who saked for his return to duty While on this leave he had also made some joings

Two months after leaving the hosp tal for duty be returned complaining b therity and constantly that the fingers of his hand were clenched o the raim and that the nafts were cutting the flesh and burning life fire he could not sleep and paced the floor the



Fig 10. Roentgenogram of tendoplastic thigh amputation. Patella has been removed and quadriceps tendon has been turned over the end of the femur. The periosteum was left adherent to the dustal end of bone. No sour

Foreign bodies were not removed.

Fig II X ray of Geltti-Stokes stump in which patella has lost anchorage to femur and there is osteomyehtis of patella and femur

typical picture of the painful phantom limb syndrome

On questioning this patient about the onset of the trouble he related the following story After going to duty he did well and had no trouble. He had joined a paratroop battalion. After training with them he had finally talked his superior officers into ending him overseas again with the combatants He arrived at the Port of Embarkation Here he was given a medical examination. The examining medical officer put his hand on the prosthesis and as he did so sand You can t go overseas with a wooden The patient amoutee said that at that instant he became infurnated that the fingers of his amputated extremity dug into the palm of the absent hand with excruciating pain and that if his arm had been his own he would have slugged the damn doctor This pain pattern had persisted since this disappointment

This patient insisted his pains were due to pai pable neuromas in the stump. At his insistence and with great skepticism these neuromas were removed His complaints continued unabated Then one day about 2 months after the removal of the neuromas out of clear sky he came to the Medical Officer in the ward with a telegram in his hand and announced that he was cured. He stated emphatically that he had no discomfort in his stump and no phantom sensation. To demonstrate his recovery he waved his prosthesis around and lifted a table off the floor with it. It had been impossible prior to this to get the patient to wear the prosthesis. The telegram which he had received was an order from a relief organization for him to go overseas for duty with them in the Zone of Activity

This case history is well worth remember ing. It does not infer that knowledge concerning the painful phantom limb syn

drome is complete and that there may not come in the future some organic approach to this distressing problem. At present, how ever the painful phantom limb syndrome should be listed as a condition not relieved by surgical treatment. A careful analysis of all these patients will reveal one or all of the following factors to play a prominent rôle viz drugs alcohol or severe maladjustment and frustration.

#### SKIN GRAFTS IN AMPUTATIONS

There has been some advocacy of the use of split skin grafts to hasten healing of open amputations and also of the use of pedicle grafts to conserve length in a short stump No type of skin graft will stand the wear of a prosthesis and under no circumstances is even a pedicle graft a justifiable final procedure in the lower extremity. There may be rare in stances in the upper extremity in which a pedicle graft will preserve valuable length in the arm the wear and tear from the prosthesis is not so great and the circulation of the stump is usually superior to the lower extremity.

Split grafts have been advocated to produce early healing of open amputations and shorten the time of invalidism. Split grafts can be successfully applied early to open amputation stumps. However, if these stumps are given the proper postoperative attention by keeping

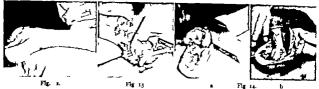


Fig. Skin incision for Syme amputation. Fig. 3. Discriticulating ankle from inside out in Symamputation. The oscale is being shelled out subperioste. By to prevent damage to blood supply of heel fign.

Fig. 14. Syme amputation. Section of tible and fibria centimeter provincal to articular surface of tible. Section at this low level proserves flare of ankle joint a, Saw is cut b, Articular surface being removed.

traction applied a split graft is not necessary The use of split skin grafts to produce early healing does not make the final surrery for an open amputation easier but more difficult. The normal skin rather than coming over the end, as it does with traction recedes to the margin of the skin graft. Consequently when the final surgery is done there is a paucity of normal skin and the result is that useful bone length must be sacrificed. If a severely trau matized or burned extremity has extensive skin loss and there is much loss of plasma early grafting may be the only means of restoring protein balance. Skin grafting of stumps for other than this reason is rather useless surgery If for any reason skin grafts are to be used the donor site should not be any place on the extremity which is expected to use a proathesis as too often painful irritable keloids result at the donor site which inter fere with the wearing of a prosthesis.

#### END-BEARING STUMPS

There is considerable disagreement in opinion regarding the ideal Inigh stump. These differences of opinion are almost on the basis of nationalism. The British take the stand that no amputation stump is suitable for bearing weight on its end, and that end bearing stumps will not stand up over a long period of time. They fit all lower limb prostheses even for a below the knee amputation so that weight is borne on the ischall tuber out?

The general consensus of American sur geons is that an end-bearing thigh stump is the best thigh stump possible Certam Canadian surgeons are staument advocates of end bearing stumps and are great enthusiasts about the Gritti Stokes thigh amputation in which the patella is attached to the sectioned femur for the weight bearing end. They are also great champions of the Syms amputation, an end bearing tibal stump. The British quite stalwartly condemn both the Gritti Stokes and the Syms amputation.

Our experience makes us feel that an end bearing thigh stump is the desirable type of thigh amputation to obtain when possible in an individual under forty. We have seen this type stump stand up under the most vigorous usage that can be given them and we feel that the patient walks with a more secure and better gait. We are not greatly enthusiastic about the Gritti Stokes type of end-bearing stump The reason for this is that despite the best of technique in carrying out the operation the patella will in a certain number of instances, slide off the end of the femur resulting in an unsatisfactory stump. Its scope of application is also very restricted. Where there is any chance of even the mildest sepsis, complications are likely to be very time consuming It is an osteoplastic operation, which to be successful requires the patella to unite by bone to the end of the femur just as any fracture heals. Even a mild infection may result in a failure of umon of the patella to the femur or in an osteomyelitis of both the patella and femur Because of potentially infected tissue the Gritti-Stokes type of amputation is not often applicable to the re-

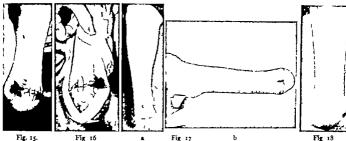


Fig. 15. Syme stump closed, drain in angle of incision for 72 hours.

Fig 16 Syme amputation. Cruciate straps of sterile flamed glued to skin, immediately postoperative to prevent displacement of heel pad from center of stump

amputation or closure of open amputations that have been done for trauma. In addition the tendoplastic type of end bearing thigh stump in which the patella is removed and the quadriceps tendon turned over the end of the femur produces an end bearing thigh stump which is just as good as the Gritti Stokes stump (Figs 10 and 11)

The Syme amputation has never been very popular in this country. It has had a lukewarm reception for the following reasons. Until the last few years it has been difficult to obtain a satisfactory prosthesis for this stump and American leg makers were not interested in supplying one. The Canadian limb makers have developed an excellent prosthesis for the Syme stump which is now universally available in the United States. Being unfamiliar with this operation. American surgeons have had too many failures due to necrosis of the sain flaps and to a misalignment of the heel pad

The operative technique and the post operative care of this stump are more exacting than in any type of amputation. The blood supply of the heel flap comes almost completely from the medial side through a branch of the posterior tibidi artery. If the operation is done from the inside out by disarticulating the ankle through the anterior portion of the incision and the os calcus is removed sub

Fig. 17 Good Syme stump. Weight bearing heel pad is centered under tibus, with neither varus nor valgus devia

tion a Anteroposterior view b Lateral view

Fig. 8. Poor Syme stump The heel pad has slipped to
tibual side of stump

periostially the blood supply to the heel flap is never endangered and the chances of skin neurosis are obviated. If the foot is removed from the outside inward and the skin fat flap of the heel is taken off the os calcis extra



Fig. 19. Prosthesis on Syme stump (right leg). No corset above knee. The patient has below knee amputation of left leg which requires corset on thigh.



Fig. 30. Chopart foot tump. The anterior dorsileror muscle group have no attachment to taruns. The remains of the foot is fixed in extreme equinus which is an unusable position.

Fig. 21 b

Fig. Short below knee stump projects a lackes below thigh with knee flexed. Very valuable to patient in motivating prosthesis. Stump of this length should be aveed. a, Anteroposterior view b, Lateral view.

periostially the blood supply of the flap will be cut off in a considerable number of instances.

There is a tendency for the heel flap to slide to the inside of the stump or to assume a varus position so that the pad of the heel is to the end of the tebia, like a side car on a motor cycle, and this, of course produces a useless stump. This sliding of the heel flap is very easily avoided by maintaining it in place over the end of the tibla with adhesive straps which are changed at intervals for a period of 4 weeks. At the end of this time the pad is well stuck to the tibra and there is no further danger of medial displacement.

For a male the Syme amoutation is the best possible amputation stump in the lower limb It has the advantage that the prosthesis does not extend above the knee. In the prosthesis the nationt can walk and stand longer than with any other type of leg amputation and it is possible for a patient to walk with a gait that is so close to the normal that the public will not know he is an amputee. In addition to these facts even without the prosthesis the nationt need not use crutches or hop Because of the length of the stump and because it is end bearing he can walk about the house at night on the end of the stump or when swimming or golfing he can get around to the shower and bath without having to carry crutches with him (Figs 12 to 19)

The Syme amputation is not a good amputation for a woman The prosthesis for this

amputation is bulky and unsightly at the ankle. From a cosmetic viewpoint, it is probable that women would not be happy with this type of amputation despite its superiority of function.

The British objection that this amputation will not stand wear and tear is without foundation. In Toronto there are many patents with a Syme stump who have been at work on the stump every day during the 25 years which have elapsed between wars. We have also used this type of amputation in some 60 patients and they are doing well. It has been used whenever possible in all Army Amputation Centers during the present war and the American surgeon will become more acquainted with its value.

#### AMPUTATIONS THROUGH FOOT

Many types of amputation preserving the Chopart amputation. These types of amputations are frequently tried because of the fact that they preserve the ankle joint. The Chopart amputation is doomed to failure and should not be done if the muscles in the front of the leg have lost their attackment to the stump of the fool. This is simple to determine. If these muscles have an attackment to the foot the patient can dorsifier the foot stump the attachment of these muscles to the tarius can be preserved the Chopart or any amputation through the foot should be done in preference to a higher amputation as the

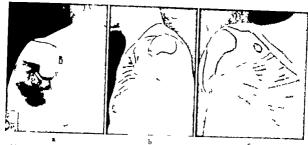


Fig. 22. Arm amputation stumps of no functional surgical neck of humerus. c, At pectoral insection

lat m of shoulder b Through (Courtes J B.

individual will be less handicapped. This of course does not apply to amputations done for arternal disease

In instances where the anterior muscle attachments to the foot the anterior tibial cannot be preserved the foot stump will gradually and inevitably assume a fixed equinus position due to the unopposed action of the gastrocnemius soleus muscle group and the foot stump in this position will be a handi cap rather than a benefit In instances where this muscle imbalance cannot be prevented a Syme amputation is preferable to the deformed remains of the foot (Fig 20)

## SHORT BELOW KNEE STUMP

A question which often faces the surgeon is how short a below the knee stump is useful and should be preserved. Or to put it another How much of the leg must remain before an amputation is done through the femur and the knee discarded? A good rule to follow is that any length of stump which can be seen to project when the knee is flexed should be saved. A stump which projects as little as 1 inch with the knee flexed is of value to the patient as a motor for moving the prothesis through the normal knee Although a patient with such an abbreviated below the knee stump will have to wear the same type of prosthesis as an above the knee amputee he will use the prosthesis better and will have greater security and control in going down

inclines A patient with a stump which projects 21 inche below the thigh when the knee is flexel will be able to do well with the ordinary below the kneeprosthesis and will net need in ischial bearing prosthesis. An occarmal leg maker will depreciate these short bel with knee tump because they are dimenli to nt but the knee should never be sacrificed in an individual who has good irculation if the stump can be seen to proie t when the tibia is flexed to a right angle on the femur (but 21)

#### UPPER INTREMITY AMEUTATIONS

Amputations of the upper extremity are not common in civilian practice and it is therefore rare that a civilian surgeon has much experience in dealing with the problems of these individuals. The general attitude of surgeons toward amputations of the arm is



That graph 4 stenu e harress emu er l t kery prosther! I plac on amount bon from pect sertion t shoulder (Courtesy of J. Box 5 g)

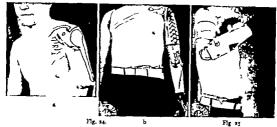


Fig. 34. a, Idea upper arm stump. b, Prosthesis on upper arm stump. Dotted area is space required for elbow block and mechanism. (Courtery J. Boss Serg.)

Fig. 35. Prosthesis for an above elbow stump. Dark triangular area contains lock which patient must manipulate with other hand to obtain different degrees of firston and extension. (Courtery J. Boss. Serg.)

to save all possible. This is a good attitude but it can be elaborated a little further as some arm stumps are more satisfactory than others

No amoutation through the humerus above the level of the humeral insertion of the pectoralis major produces a stump which has any functional value worths of consideration This fact does not mean that the head of the humerus should be removed unnecessarily as it tends to round out the shoulder and from a cosmetic viewpoint is desirable. Even though an inch or two of the humerus remains, if the pectoral attachment has been lost the end of the short piece of bone is pulled by the rotators into abduction and forward flexion. Amputations just below the pectoral attach ment also produce stumps of little value in motivating a prosthesis. At this level the remainder of the humerus stays opposed to the thoracic wall and just a little forward and backward motion of the atump is possible this movement is practically valueless in using an artificial arm. To maintain a prosthesis in place on these high amputations, an elaborate uncomfortable harness is necessary Because of the uncomfortable harness, the weight of the prosthesis, and the uselessness of the artificial extremity most patients ultimately discard the mechanical extremity and go about with an empty coat sleeve (Figs. 22 and 23)

The best site for an amoutation through the humerus to secure the bone length adapted to the most efficient use of a prosthesis is the level just above the beginning of the flare of the condyles of the humerus. At this site 2 to 3 inches of bone above the elbow are removed Amputation here is superior to a disarticulation through the elbow as it allows room for the mechanism of the elbow block, without placing the elbow at a lower level than the remaining arm and thus making a disproportionate forearm. The absence of the condules and the loss of the dustal 2 to 3 inches of the humerus do not detract enough from the functional value of the humeral lever to offset the cosmetic and mechanical difficul ties in the prosthesis (Fig 24)

The importance of saving the elbow joint when possible cannot be too greatly stressed. The functional value of the elbow to the upper extremity us even greater than that of the knee to the lower extremity Without an elbow joint under voluntary control, the arm amputee is limited to a few positions of the forearm, under the control of a mechanical lock which he must unlock with the other hand to release. In close quarters, even with the ideal humeral stump he may have to place the forearm of the prosthesis in one of a few positions available with the other hand Even a relatively short stump of the forearm

will obviate this difficulty to a large degree The short stump of the forearm need contain only a piece of the ulna and the necessity for removing the proximal end of the radius does not interfere with active flexion of the elbow since the brachialis muscle attaches to the ulna. An elbow joint is of great value even though it does not have total motion elbow joint is also of value. The condition of the humerus above the joint does not have to be normal to make the elbow worth saving As the arm is not a weight bearing extremity a fibrous union of the humerus may suffice for excellent use of the forearm stump since the corset of the prosthesis will stabilize the humerus, as the sidebars will stabilize a tlail joint at the elbow No unnecessary recon struction which through long immobilization might lend to stiffness of the elbow should be proposed when it will jeopardize function (Figs 25 and 26)

The ideal forearm stump is one through the junction of the middle and lower thirds of the forearm This level provides enough bone length for a firm grap on the cuff of the prothesis by the stump and permits 2 to 3 inches of the volar surface of the forearm below the elbow to be unencumbered by the prosthesis cust This eliminates interference with slevion of the elbow caused by the cuff pinching and impinging on the front of the arm This level is also just above the site at which the forearm becomes largely tendinous and avascular Such a stump has an excellent blood supply is warm and will tolerate well the rubbing of a prosthesis cuff Forearm stumps shorter than this are very useful but, as the distance be tween the end of the stump and the insertion of the biceps decreases the necessity for covering a greater proportion of the volur surface is increased and flexion of the elbow may be interfered with by the encasement of the prosthesis In the lower third of the forearm after the muscles have merged with their tendons there is poor circulation as only main arteries traverse this area through this area are cold and often evanotic Ulceration of skin is not uncommon in stumps in the lower third The difference in tempera ture at these two levels can be easily detected by palpation with the hand



lg kit Shirt one bone (ulna) below ell on stump िति । अं । अधिकारिक ls birt below ellow tu ।

Disarti ulation through the wrist joint is it is a fact aniputation. It has all the disards into a fact tump in the lower third of the fact arm. In a left in the inferior redioullust a term to be very painted on pronation and a ration. The fact access a loss of tablity a the jean which produces pain the jame of the disarties of the period of the peri

The turn which intain the proximal or protomil in little w t carpal bones is however a very useful and satisfactory stump from the fun to nal viewpoint. From the eismetic a peet it has a few disad The reason to the superiority of this stump to the disarticulation through the wrist are obviou Lirst of all it must of necessity be covered by tissue with a good blood upply -as the primar flap of the heel and upper half of the hand second the in ferior radioulnar joint is stable and painless because of the presence of its normal abut ments and ligamentous support. Third there are no bony unpudded prominences. The length of the stump containing carpal bones together with the slight voluntary flexibility of this distal end make it of considerable aid to the patient without a prosthesis stump can be used satisfactorily for a stabilizer in such activities as driving a car tving shoe laces tying a nicktie buttoning a coat et cetera. This stump also requires much less harness to keep the prosthesis in place and to motivate it powerfully (Fig.



Fig. 34. a, Idea upper arm stump b, Prosthesis on upper arm stump. Dotted area is space required for elbow block and mechanism. (Courtery J. Bras Surg.)
Fig. 5. Prosthesis for an above elbow stump. Dark triangular area contains lock which patient must manipulate with other hand to obtain different degrees of fersion and extension. (Courtery J. Bone Sure

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simple surgical procedure that is not mutilating and it would seem that in certain well selected patients its trial might be justifiable. The skin tunnels can be easily removed with out detracting in any way from the previous value of the stump if they are found unsatus factory.

## PHYSICAL THERAPY IN POSTOPERATIVE CARE

Physical therapy has a definite rôle in the postoperative treatment of the patient who has lost part of an extremity, and this rôle is too often not clearly enough understood by the surgeon Massage has very little place in returning the stump to its optimum condition Its only use is to free an adherent scar. Its efficacy in shrinking a stump is of little value and is far surpassed by the use of elitic bandages, properly applied and by the use f a temporary walking prosthesis such a pylon. The real shrinkage of the stump take place with activity and weight bearing and may be so rapid as to make a new leg a pen fit in a few weeks. Shrinkage should be a counted for to a large degree before the par manent prosthesis is obtained

The real value of physical medicine in the care of the amputee is in (1) the prevention and relief of contractures and (2) the de velopment of the muscles which will later be used in motivating the prosthesis

It is a very common thing for an amputee to develop a contracture of a joint in the involved extremity during the preoperative and immediate postoperative period. The joints most commonly involved in the lower extremity are the hip and the knee and in the apper extremity the shoulder

The flexion contracture of the hip is the most serious detriment to the proper use of a

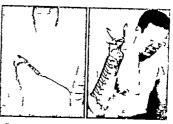


Fig. 3. Proathesis for forearm stump with carpal bones. I ft. Light harness. b, Powerful control split book in posit in (Ciu (esy J. Bone Surg.)

Frosthe is and is most frequently overlooked. The intraction is due to a shortening of the later dier abductor muscles of the thigh. With the tump abducted it is not obvious with the tump at lusted it may be very prominent. The left must makes it necessary for the quite it must make it necessary for the quite it must be defent to bend forward and thus it unit to gravity or to arch his back to any interest to gravity or to arch his back to any interest to fick and over his feet. The composition by increasing the lordosis leads to lack a he and to early arthritic changes in the line.

The titing of a prosthesis to an abducted or flexed stump is difficult and the deformity must be compensated for It is this deformity in the thigh stump which leads to the bucket striking the adductors and pubis and causing great discomfort. In very short thigh stumps the flexion-abduction contracture cannot be obviated and the bucket must be especially constructed to accommodate for it.

In all thigh stumps which preserve half the length of the leg this contracture can be re-



Fig. 32. Cosmetic latex hand on long carpal bone stump. a, left, Caucasan, cosmetic prosthesis on right hand. b Negro, cosmetic prosthesis on left hand. (Courtesy J Bone Su g.)

heved by stretching exercises and the development of muscles which prevent it. The development of these contractures can also be obviated by the simple expedient of having the patient he periodically on the stomach instead of sitting in bed with the hip flexed or propped up on pillows for 24 hours a day

Flexion contractures of the knee occur frequently in below the knee amputations and when present to over 10 degrees are a serious impediment to walking as the partially flexed knee lets the patient down. They are best prevented and this is easily done by having the patient contract the patiella, straightening the knee which also helps to prevent atrophy of the quadriceps muscle. When present they usually yield readily to passive stretching of the hamstring muscles and the capsular structures.

In the upper extremity the frozen shoulder with the humerus bound to the side, is easily prevented by keeping the amputated extremity on an aeroplane splint in 90 degrees of abduction. This is also a very great adjuvant to healing as it obviates the dependent edema and bogginess in the ussues. A contracture of the shoulder will yield just as any adhesive burstlus to peasure stretching of the contracted pectoral muscle and active exercise of the deltoid and rotators. No amputated extremity can be expected to use a prosthesis efficiently until all contractures are released

The efficient use of an artificial leg in an above the knee amputee depends on the full development of the gluteus maximus muscle which extends the hip and the adductor muscles which pull the leg toward the midline Too often after the invalidism which has accompanied the surgery these muscles are atrophied and weak Special exercises against resistance to strengthen these muscle groups should be instituted as soon as the stump is healed from surgery It does not take a masseuse to carry these out and the surgeon who removes the leg should instruct the pa tient in them and see that he carries them out to the point of good muscular development otherwise he has completed his job no more than has the surgeon who removes an eye and leaves an unsuitable socket for the artificial

The patient with a below the knee stump, in addition to having good musculature to extend and adduct the hip must have good muscles to extend the knee. Exercises to develop the quadriceps femons should be started early and continued until there is good strength in this muscle group.

The arm amputee must have a good deltold and if he has an elbow joint must have a good biceps to flex the proathesis.

#### BUMBLARY

The open circular or guillotne amputation is the safest type of procedure in the presence of infection. Proper after-care consisting of skin traction is a requisite to a good result in this type operation. A late secondary operation is necessary as a final procedure. This combination results in a better tailored stump than the open flap type of operation.

stump than the open flap type of operation.

2 Fasca and skin or skin alone should be the only covering of an amputation stump to muscle should be turned over the end of the stump. Aperiosteal technique is neither necessary nor sound. The nerve end should be well recessed under muscle. No chemical treatment of the nerve end is necessary. Complete hemostasis is necessary to good result.

3 Phantom limb is commonplace after amputation Painful phantom limb syndrome is another thing Drugs, alcohol, and psychic factors play a great part in the production of the latter Surgical removal of neuromas does not benefit the established 'painful phantom limb syndrome and any surgical attack on the syndrome will in almost

all instances result not only in failure to cure but aggravation of symptoms.

4 Pedicle grafts are not satisfactory for weight bearing stumps and will not stand the wear of a prosthesia. Skin grafting of open amputations is not necessary if proper after care consisting of traction, is carred out. Skin grafting does not facilitate final surgery

s End bearing stumps are desirable in undviduals under 40 years. They will stand up over time. The tendoplastic thigh stump is the best end bearing thigh stump. The Syme amputation is the best possible stump in the lower extremity if the foot must be sternfeed.

6 A below the knee stump which projects as little as r inch when the knee is flexed should be saved. It is of great help in motivating a prosthesis.

7 Any partial foot stump which has the anterior muscle groups attached should be saved. If the anterior muscle group is not attached a partial foot stump will inevitably go into severe equinus deformity and a Syme

amputation is superior

8 A humeral stump at or above insertion of the pectoralis major has no functional value Every effort should be made to save the clow joint even though the stump below

it is very short. Long stumps with the carpal bones in are excellent. Disarticulation through the wrist leaves a poor stump. The best are for forearm amputation is the junction of middle and lower third.

9 Indications for cineplasty are extremely restricted. It should not be considered except

in bilateral upper extremity amputees.

10 Physical therapy has a definite place in the preoperative and postoperative care of amputees. Massage is of very little value. The function of physical therapy is to prevent and release joint contractures, and to develop musculature.

## CANCER OF THE CERVIX

## A New Technique for Interstitial Implantation of Radium into the Parametrium

## E. EUGENE COVINGTON M.D., Baltimore, Maryland

NEW technique has been developed for interstitual implantation of ra dium into the parametrium and lymph nodes of the pelvis in cancer of the cervix. This is a preliminary report on the first 100 cases. It is not an analysis of a year results as some of the patients have been treated less than 5 years. The patients treated so far have all been chinical stages I (2 cases). II (17 cases) and III (80 cases) Interstitial therapy is not justified in stage IV cancer of the cervix.

#### REASONS FOR A NEW TYPE OF RADIOTHERAPY

The new technique was developed for sever al reasons chief of which are as follows

Inverse square law The inability to deliver enough irradiation into the parametrium and lymph nodes of the pelvis by the usual course of roentgen therapy combined with contracervical and intrauterine applications of radium. It should be emphasized that the loss of uradiation due to the inverse square law makes it impossible to concentrate a lethal (10 to 12 erythemas) dose of irradiation into the parametrum and lymph nodes along the lateral wall of the pelvis by the usual contra cervical and intrauterine applications of For example, if the true pelvis radium measures 12 centimeters in its transverse diameter the center of the pelvis (Intrauterme canal) is 6 centimeters from the lateral wall. Due to the inverse square law it would take 36 times as much radium (3600 mgm. hrs. of radium) in the cervix to get 100 milligram hours of radium into the lymph nodes along the lateral wall of the pelvis. This amount would be 1 crythema or about one-tenth the amount of irradiation necessary to destroy

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cancer cells present in the lymph nodes along the lateral wall of the pelvis. It is thus obvious that some form of interstitial therapy is necessary to concentrate a lethal dose of radium into the parametrium and lymph nodes along

the lateral wall of the pelvis.

Local recurrences in the cervix. There have been too many recurrences locally in the cervix and adjacent parametria following the usual amount of irraduation. In numerous clinics an average course of irradiation therapy is about as follows 2000 r to each of four pelvic fields followed by one application of contracervical and intrauterine radium (1000 to 4500 mgm hrs of radium) The author has seen too many positive biopsies after this form of therapy A two dose technique of radium application, the last being interstitial, is now advocated thus a greater amount of irradiation can be delivered to the cervix and a much greater amount to the parametria and lymph nodes of the pelvis. Pathologists have observed from autopey studies a high percentage of deaths from cancer of the cervix with the tumor still localized to the pelvis and no evidence of generalized metastases. About one-third (reports of clinics vary from 20 to 35 per cent) of all deaths from cancer of the cervix are due to urinary obstruction from extension of the tumor into the parametris. Morton noted that almost 50 per cent of the cases of cancer of the cervix had microscopic cancer cells present in the cervix at the time of operation. This high percentage of residual cancer after radium treatment is not general throughout the country but it does strengthen the argument that there are still too many cases in which the cancer still localized to the cervix, has not been eradicated by radium Tausalg and Meigs have found positive glands in the pelvic lymph nodes at operation in

almost one-third of all early cases (stages I and II) when they were not suspected clinic ally before operation Many observers Teahan, Pomerov, Pitts and Waterman and Arneson dissatisfied with their results in cancer of the cervix with parametrial extension are advocates of interstitual implantation of radium element needles or radon seeds into the parametrium through the vaginal route It is thus obvious that interstitual therapy is necessary and must accomplish two purposes a higher total dose of irradiation to the cervix. and a more equal distribution throughout the parametria and lymph nodes of the pelvis of a lethal dose of irradiation.

3 Trend back to surgery Within recent years there has been a renewed interest in the Wertheim type of panhysterectomy usually associated with the Taussig type of lymph node dissection for selected cases of early (stages I and II) cancer of the cervix. Many gynecologists now believe the combination of irradiation followed by panhysterectomy will give a higher percentage of 5 year cures than either procedure alone. It is certainly true that a panhysterectomy is a much safer surgical procedure after the gross tumor has been almost entirely destroyed and the secondary infection cleared up by previous irradiation therapy.

Surgeons have three good reasons for their belief in a radical type of panhysterectomy for cancer of the cervix (1) There are still a few cases in which the cancer of the cervix cannot be controlled by the present-day type of irradi ation. (2) About one third (Taussig 333/5 per cent, and Meigs, 17 per cent) of all early cases (stages I and II) will have cancer cells in the pelvic lymph nodes at operation. Irradiation has a delaying effect on such cancers, but a low 5 year cure rate. (3) Improvements in surgical technique especially the modern ad vances in the control of infections, have so lowered the operative mortality and morbidity that panhysterectomy is a safer procedure than in former years. Panhysterectomy then should offer a better 5 year cure rate in early cases, and it is now up to the radiologists to offer something equal to this definite step for ward obviating the necessity of resorting to major surgery

TECHNIQUE OF RADIOTHERAPY

The author advocates a new technique for delivering a greater dose of irradiation to the cervix and a much greater dose equally distributed throughout the parametria and lymph nodes along the lateral wall of the pelvis

First radium treatment. As the first treat ment 3600 milligram hours of radium with I millimeter platinum as a filter was used as follows One long rubber tandem (oo mgm of radium X 24 hrs. = 2160 mgm, hrs of radium) was inserted into the intrauterine canal and a rubber tandem (30 mgm of radium × 24 hrs. = 720 mgm hrs. of radium) was packed with gauze as far laterally as possible into either lateral vaginal fornix. This procedure gave a fairly equal distribution of irradiation through out the pelvis Aserious mistake and probably the most common cause of radiation necrous is to concentrate a large quantity of radium in a small area usually the contracervical region giving an overdosage and thus necrosis in that small area and not enough throughout the pelvis. Packing the rubber tandems in the vaginal fornices with gauze is better than colpostat technique There are so many anatomical variations and variations in the amount of cancer present that in many instances the colpostat technique was impractical. Five grams of sulfanilamide was routinely dusted on the cervix before the gauze packing In the present day of sulfon amides and penicillin to control infections there is no reason to use roentgen therapy first for this purpose

Reenigen therapy Within a few days (usually 1 to 7) after the first radium treat ment roentgen therapy was started which was as follows 2000 to 2400 r was given to each of four pelvic fields over a period of 4 weeks. The physical factors were 400 kilovolts, Thoreus filter (1 75 mm sn 8 mm. cu and 1 mm. al.) so centimeters distance, and 15 centimeter cone portals. This technique gave a 42 per cent depth dose (42 per cent of 8000 r = 3360 r in the tumor) into the cervix (10 cm depth) and adjacent parametria.

New interstitual radium technique As soon as the roentgen therapy was completed (usually 30 to 35 days after the first radium

treatment) the second treatment or inter stitial implantation of radium was done. By this time the secondary infection was usually cleared up and most of the gross tumor especially the friable type of cauliflower growth, was almost entirely gone. A search of the literature reveals that no one has used exactly the same interstitial technique of radium as will now be described in detail as the author's technique Four small incisions (5 cm.) were made in the vaginal mucosa at equidustant points as far laterally from the cervix (usually 2 to 3 cm.) as possible. The incisions were actually in the 2 4 8, and 10 o clock positions around the cervix (Figs 1 2 and 3) It should be emphasized that the cutting was only through the vaginal mucosa and not into the parametria. A long Kelly clamp was next used to dissect a long tract (usually 2 to 4 cm) into the parametrium through each of the four incisions. This dissection is the most dangerous part of the whole procedure but by care patience and experience the author has now done this new procedure in well over 100 patients with no evidence of injury at operation to a blood vessel ureter bladder or rectum in a single case.1 After dissection of the four tracts as described four rubber tandems were made up as follows two tandems contained 25 milligrams of radium, and two tandems contained 20 milligrams of radium (usually 2 tubes of 10 mem each) A rubber tandem was then inserted into each of the four tracts. This gave 1260 milligram hours of radium (45 mgm of radium × 28 hrs. = 1260 mgm. hrs. of radium) into either parametrium or a total of 2520 milligram hours of interstitlal radium. A long rubber tandem (60 mgm. of radium X 28 hrs. = 1680 mm hrs. of radium) was then in serted into the intrauterine canal. Five grams of sulfanilamide was routinely used locally and the vagina was packed with gauze. The gauze packing helps to push the bladder and

# TABLE L-TOTAL PRADIATION GIVEN IN

100 0	ASES.			
	later.			
First radium la intrauterine				
tunal Second radium in intranter-	<b>1160</b>			
ine canal	1680			
Total in intranterine canal. First radium in right fornix.		5840		
Second radium in right para-	710			
metrium Total in right foreix and pa	1100			
rametrum		zgða		
First radium in left fornix. Second radium in left para	720	•		
metrium	sóo			
Total in left formiz and para metrium				
		1030		
Total radium Roustarn therapy in cervix		7800		
and parametria			1360	
(8000 r given, depth dose equals 4s per cent at 10 cm.				
with 400 kv.)				

rectum forward and backward respectively away from the radium.

#### TOTAL RADIATION GIVEN

A glance now at Table I will show that irradiation given over a period of 35 to 40 days, by use of a two dose radium technique, the last being an interstitual application, combined with roentgen therapy as described accomplished two purposes a high total dose given to the cervix (1840 mgm hrs. of radium + 3360 r-42 per cent of 8000 r-of roentgen therapy) and a high total dose fairly evenly distributed throughout the parametria and lymph nodes of the pelvis (1080 mgm hrs. of radium + 3360 r of roentgen therapy to either parametrium) The total irraduation given directly into the tumor is thus 7800 milligram hours of radium + 1360 r of roent gen therapy

#### CONTRAINDICATIONS YOR INTERSTITIAL RADIUM THERAPY

Interstitial implantation of radium was always discontinued for any of the following three conditions

I Radiation fibraris There was an occasional patient, most commonly an ekierly woman who would develop so much fibraris from the first radium treatment and the 8000 r of roentgen therapy previously given that the

This was dissection and implicate aims or others techniques was done served limes to the arrayer years on first activates below extracted for on parlamit. The classerings of the intent was done by the answer described and disseasy radious trainess were implicated. The photomic was expect and the least flow of the 4 trainess were written to the answers of the fact these arrays are the contract when when the answers of the section of the section, when the correct and learn's with of the parks were measured. That tandems were smally in 5 continues on these lates to correct, markle as the lapt blood veneral, and learn's with

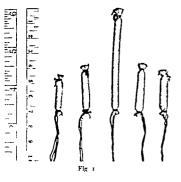


Fig. 1 Photograph of the actual radium tandems used for this series of 100 cases. There are a rubber ta dems (2 contain a 25 mgm, tube of radium and 2 contain a 20 mgm. or a 10 mgm tubes of radium) for interstitual implantation into the 4 carefully dissected tracts of the parametria and a long rubber tandem (either 3 20 mgm tubes of 2 30 mgm tubes of radium) for intrauteri e application. The tandems are made of Dakin's tubes (2 mm of rubber) with strong silk strings attached. The filter is thus I millimeter platinum, 2 millimeter rubber It will cause less necrosis than radon seeds (3 mm gold filter)

Artist's drawing of implantation. Note the positions of the 4 tandems for i terstitial implantation situated at equidistant points (s to 3 cm. lateral to the cervix) at 2 4, 8, and 10 o clock positions. Note the absence of a contracervical application. The author beheves they concentrate too large a dose of irradiation to the cervix and thus cause necrosis.

Fig 3. Photograph of a roentgenogram showing the locations of tandems and the long i trauterine tandem (the s large radium capsules centrally located). Note that the a tandems in either parametrium are about one-half the d stance from the middle of the pelvis (intrauterine canal) to its lateral wall thus givi g a wide and equal distribution of a lethal dose (1260 mgm hrs. of radium) to either parametrium.

dissection was difficult and probably too dangerous. Interstitual therapy would surely cause more fibrosis and thus increase the possibility of late complications, i.e. urinary obstruction from stricture of the ureters, sciatic nerve pain from the pressure of scar tissue on the sciatic nerve plexus or stricture of the rectum

Infection An occasional patient, usu ally with the infiltrative type of lesion still had too much infection present following the

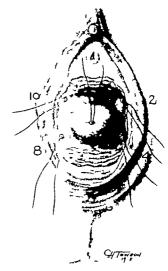


Fig a



Fig 3

previous radiotherapy to justify the risk of dissection and parametrial implantation of radium. A persistence of infection was nearly always due to two causes (1) radiation necrosis from a previous overdosage of radium concentrated to a small area or (2) uncon trolled cancer. A combination of local infection and radiation necrosis was usually a sign of a bad prognosis.

3 Advanced cancer Many times examina tion under anesthesia would reveal a more advanced lesion than was thought present before operation. This has been a common error Many of the cases, especially in the early days of development of the new technique called stage III we would now classify as stage IV. The personal equation and en thusiasm of different authors vary and thus the differences noted in the classifications of the clinical stages of cervical cancer.

#### ADVANTAGES OF INTERSTITIAL RADIUM THERAPY

The author claims the new technique of interstitual radium implantation into the para metria has the following advantages (1) It eliminates the necessity for an abdominal operation (2) Positive biopsics after treat ment are less than was noticed by the older method of therapy thus the 5 year cure rate should be higher (3) It gives a more equal distribution and higher total dosage of irradia tion in the parametria and lymph nodes of the pelvis. There have been only 4 cases (4 per cent) of death from urinary obstruction due to parametrial extension as contrasted with the 20 to 35 per cent as recorded in the literature (4) The filter (1 mm pt + 2 mm of rubber) causes less necrosis than radium needles or radon seeds. Radon seeds have a filter of 3 millimeter of gold which allows enough beta rays to pass through to cause necrosis adjacent to the seeds. (5) There is no danger of punc turing a blood vessel ureter or bladder when the blunt rubber tandems are inserted into the four carefully dissected tracts. This is a sen ous danger when radium element needles or radon seeds are inserted blindly into the para metrium (6) Radium element needles with silk strings attached will occasionally get hung in the tissues on attempted removal. Several

observers have had this embarrassing experience making operative removal necessary. This mishap has not occurred with the rubber tandems placed in the carefully dissected trans-

#### COMPLICATIONS OF INTERSTITIAL RADIUM THERAPY

The possible complications of this new technique for interstitial implantation of radium into the parametria were both early and late.

Early complications The dangers or possible early complications from the operation were as follows (1) damage to the ureters with ex travasation of urine (2) damage to a large blood vessel with hemorrhage (2) opening the pentoneal cavity with peritonitis as a result and (4) pelvic cellulitis through any one of the four openings into the parametria. In this first 100 patients treated by the new technique none of these possible mishaps have occurred. This fact alone convinces the author that the new technique is certainly a safe procedure and could be learned easily by any radiothers pist with surgical training Cystitis, proctitis, irradiation sickness and erythema with desquamation of the skin around the pelvis were noted with about the same frequency with the new technique as was noted by older methods They were at times troublesome and annoying to the patient but never serious.

Late complications The late complications from interstitial radium implantation were more serious than the early and were noted as follows (1) A fairly severe proctitis was the most common late complication and was noted in 6 patients, 1 of whom developed a stricture severe enough to require colostomy The other 5 patients still have occasional attacks of diarrhea with bloody mucus in the stools. Proctoscopic examination showed the typical picture of irradiation proctitis, usually most pronounced about 6 to 8 centimeters above the anus. All 6 of these patients are clinically free of cancer (2) Rectovaginal fistulas have been produced in 4 patients 3 of whom probably had stage IV cancer and should not have been treated by interstitial therapy All 3 of these patients have necroses, fistulas, and still have positive biopsies after the heavy total dose of irradiation given in this series. The fourth patient is living and clinically free of

cancer over 5 years, but she still has the fistula The author considers this fistula was due to overrradiation (3) Irradiation necrosis of the cervix was present in several cases, especially the late stage III (or IV2) cases in most of which cancer was still present locally in the cervix after treatment. One patient has devel oped late irradiation necrosis of the cervix several months after treatment and is still clinically free of cancer (4) Urinary obstruc tion was the ultimate outcome in 4 patients each of whom had cancer clinically in the para metrum and in a cancer was proved by autopsy. This complication was studied care fully because interstitial radium therapy always produces more fibrosis than external irradia tion. It is certainly safe to say that extension of cancer into the parametrium was several times more common as the cause of obstrution to the ureters than irradiation fibrosis (5) Secondary vaginal hemorrhages were a serious complication in 7 cases. There was also I fatality from rectal hemorrhage every case of secondary hemorrhage the pri tient had uncontrolled cancer in the cervix

Briefly to summarize the complications of interstitial irradiation there were no early complications from the implantation there were 6 cases of irradiation proctitis 1 case of rectovaginal fistula and 1 case of radi ation necrosis of the cervix as late complica tions. All the remaining cases of fistulas necroses secondary hemorrhages urmary ob structions and distant metastases were due to uncontrolled cancer and not to overgradiation

#### RESULTS

The primary purpose of this paper was to show the necessity of interstitual radium ther apy for cancer of the cervix and the advantages of a new technique used by the author in 100 cases. It is not a 5 year study as a few of the patients were cared for less than 5 years ago Seventy-six patients (76 per cent) are still living and under observation and 24 patients (24 per cent) have died of cancer The Lnown causes of death were as follows 3 patients had rectovaginal fistulas, 2 had bone metastases 2 had pulmonary metastases 4 died of urinary obstruction 7 had secondary vaginal hemor rhages, and 1 died of rectal hemorrhage

#### SUMMARY AND CONCLUSIONS

From a study of the 5 late complications of irradiation the causes of death in 24 patients and the high percentage of positive biopsies of lymph nodes of the pelvis found at operation by surgeons it should now be obvious that a higher total dose of irradiation should be given to the cervix and a much higher total dose equally distributed throughout the parametria and lymph nodes of the pelvis

There were no early complications from the interstitial implantation of radium but there were 6 cases of irradiation proctitis i case of rectovaginal fistula, and I case of radi ation necrosis of the cervix as late complications. The 22 death, were the result of uncontrolled cancer of the cervix and adjacent parametrium

The advantages and contraindications of the new type of interstitial therapy were discu sed in detail. Emphasis was placed on the great i satety of this procedure over other I simi I inter titial therapy

It author ha tried to accomplish the 1) To eliminate the necessity of a mai r u a il procedure for early carcinoma the creat (2) To improve the complete radication the growth in the cervix. There here been i her positive biopsies after treat nunt thu the 5 year cure rate should be bet ter There have been only 4 deaths (4 per cent) from stage II cancer of the cervix and none from stage I This rate is far better than was obtained by previous methods of radiotherapy (3) To reduce the number of deaths from parametrial extension of cancer by giv ing a higher total dose of irradiation equally distributed throughout the pelvis. This has also been effected as only 4 deaths (4 per cent) were due to urmary obstruction contrasted with the usual 20 to 35 per cent recorded in the literature

#### REFERENCES

- ARNESON A. N. and HAUPTMAN H. South, M. J.
- 1 1940, 3 285-935.
  2 Meros, J V Surg Gyn, Obst., 1944, 73 195-199.
  3 Mostros, D J Am J Roenty, 1933 99 487-496.
  4 Pittis, H. C. and Waterman G W Am J Roenty.
- 4 HITTS, H. C. BRI WATERMAN O'N AM J KOCOUL.
  1946, 43 505-376
  5 PORLE, E. A. Clinical Roentgen Therapy Philadelphia Lea Feblger 1938
  6. POMEROY L. A. Quoted by Poble, E. A. (5)
  7 TAYSIN F J Am. J ROCRE, 1939, 43 443-448.
  8. TEARAS, R. W. WAINOCH H. W. and WEATHERWAX
  A. TEARAS, R. W. WAINOCH H. W. and WEATHERWAX I J Am M Am., 1942 120 423-426

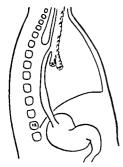


Fig. 1 Schematic representation of abnormality in case bere reported. Upper end of the ecophagus ends bindly Lower end of ecophagus communicates with posterior portion of lower part of the traches. Superior sequence is the ecophagus is slightly dilated while the inferior one squite small.

of salaw appeared in the bab's mouth and it was necessary on several occasions to suck these away in order to establish a satisfactory airway. On the second day of life a dilute formula was officred but the feedings were promptly regurgitated. All at tempts at feeding were followed by respiratory difficulty and cyanools. The infant was seen in consultation by Dr Adelman and was referred to

this bospital with a diagnosis of esophageal atresia. Physical examination on entry showed a well developed and well nourished white male infant in no acute distress Temperature was 99 2 degrees F respirations 24 pulse 120 The color was good and there was no cyanosis at the moment. The skin had a slightly interior tint which was regarded as a physiological jaundice. The head eyes ears, nose and throat were normal. The sides of the chest moved equally, there was no intercostal retraction percussion note was resonant over both lung fields. There were numerous fine, most rales and coarse rhonchi throughout the entire chest more marked at the right apex. The heart was not enlarged to per cussion. The cardiac sounds were of good quality and the rhythm was regular. There was no murmur The abdomen was slightly tympanitic, and was normal to palpation The liver edge was felt just below the costal border The genitalia, extremities and reflexes were normal. By rectal examination meconium was found on the examining finger

Roenigenologic examination was made immeditable from the following a first admission. Under the fluoroscope a No 8 French urethral catheter was passed through the maints nose and down into the esophagus. The catheter would not pass into the atomach since it met

some obstruction — the a iddle portion of the esoph agus — Two cubic entimeters of lipitodol were now introduced through the catheter. A blind esophageal pouch (atreasa) was demonstrated at the level of the 4th thoracic vertibra (Fig. 2). Fluoroscopy and film studies showed a considerable amount of gas scattered through the stomach and intestines indicating the existence of a fistual between the traches and the lower segment of esophagus. There were patches of a telectasis and emphysems throughout both lung fields the changes being most marked in the right upper 1 bbe.

The infant was placed in an oxygen tent. The upper blind end of the esophagus was kept cleared out by an inlying catheter which was passed in thr ugh the nose and was connected to a Wangen t n u ti n apparatus Intramuscular penicillin val tarted in loses i 3 000 units every 3 hours > hum ulta hazine was given subcutaneously with and ubsequent doses of t 4 h urs I arenteral fluids were Lini o ulic centineters of 5 per cent al mit in at rittray n u ly and 100 cubic centi-Llu nt gluc su in 0.47 per cent 1 m t t 1 by Linially Att r 12 hours of this الهin ril lad la i lisal peared from the rat cibtin se'med optimal for Ç ja at

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Fig 2 Lateral roentgenogram, with baby in upright position. A catheter has been introduced into upper portion of the copingus and a cubic centimeter of inheidolhave been instilled. This indired of outlines for semestertent of the blind upper acc. Air in the stomach and intestince indicates that the trackes must communicate with the lower ecophageal segment.

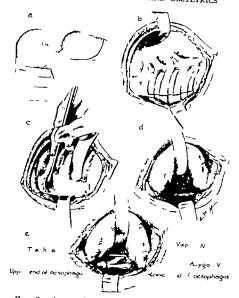


Fig. 5. Operative approach after Lanman, Ladd, and Haight and Towaley. a, Curviborat incision, dividing lower part of the traperins muscle and the rhomboid major to that the scapula can be retracted laterally b, Scapula retracted. Portions of juri, than dight in the mextered misperinsteally. I terrostal muscle bundles ill be cut posteriorly along the black line. c Peeling parietal pieura off. topostrior destat wall and pushing it forward. d Asygos we'n coming into view in depths of womd. Asygos end ndivided, nottrance to medications provided. Mediastunal structures expenses.

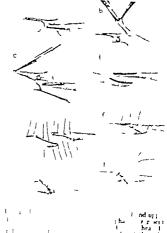
the infant was placed in a prone position with the right boulder elevated slightly (Fig. 3). A curved incusion was made just inside the medial border of the right scapula running downward and outward around the angle of the scapula. The superficial muscles were divided and the scapula was reflected upward and laterally, and the costal cage exposed. The erector spinae muscles were mobilized slightly toward the miles. Subperiosteal resection of the segments (about 3 cm long) of the syd 4th and 5th ribs was now carried out. The bundles of intercostal muscles with their accompanying nerves and vessels.

were divided. The pleura was then stripped forward by blunt dissection from the vertebral bodies and the anygon with exposed. This was was doubly as the stripped forward in the stripped forward the transfer and divided. Dissection was continuous out the transfer and the stripped forward the stripped forward the stripped forward the stripped forward to a point opposite the lower segment of esphans had a hattilous communication with the posterior strates of the traches about 35 inch above the carina (Fig. 4a). There was some thin arcolar tasue between the two esphagael segments. The lower part of the

esophagus was now extensively mobilized as far down as the diaphragm though this was accomplished at considerable risk to its blood supply. The tracheo-esophageal fistula was ligated with No 2000 silk close to the traches and was then divided (Lig 4b) Along slit was cut in the lower esophageal tube The upper esophageal pouch was extensively freed from surrounding structures up to the base of the neck. The thinnest area of this pouch was on it anterior surface along which an opening was made Stay sutures of No 00000 silk were placed in the four quadrants of each esophageal end The No S urethral catheter in the nose and upper esophagu was now pushed downward by the anesthetist so that it could be threaded into the lower segment an i into the stomach. The near ends of the stay sutures were first tied following which the far ends were tled and thus the walls of the esophagus were rolled inward at the anastomosis Next 7 or 8 interrupte ! sutures were used to join and turn in the musculars between the stay sutures. An effort was mad t establish an oblique type of union in the belief that this might have less tendency to subsequent strictum formation. In anticipation of this type of junction slits had been made in each segment and it wa thought desirable to make each slit where the respective segment seemed thinnest. In each case the was on the anterior surface. Unfortunately this procedure necessitated rotating the lower segment through a twist of 180 degrees in order properly t appose its opened end to that of the upper pouch (However this twist has in no way interfered with the subsequent function of the esophagus) mediastinum was thoroughly irrigated with soline sucked out, and then filled with 25 000 units of peni cillin solution A narrow strip of soft rubber drain was placed near the anastomosis and was led out through the inferior angle of the skin wound The chest was repaired by joining the intercostal muscl bundles posteriorly closing the superficial muscl layers and then approximating the skin Deknat ! No occoo silk on atraumatic needles was employed throughout the procedure for both the cophageal ana tomosis and the wound closure. The infant stood the operation quite well

Postoperative course. The baby was again placed in an ovegen tent which was discontinued in 24 hours. Four hours after operation breast mill was injected through the inlying gastric tube and was increased in a few days to supply full calonic requirements. A transfusion was given after operation and on the following day. Clyses were continued for 4 days. The infants pulse and general condition were extremely statisfactory throughout the post operative period. The mechastinal drain was removed on the 5th day, there having been a discharge of only a few cubic centimeters of thin, sero-oan resulted with the continued of the sero-oan resulted with the continued of the sero-oan resulted with the course of the sero-oan resulted with the sero-o

the time of removal of sutures 3 days later. Since we were unwilling to attempt feedings by mouth at so early a date and since we did not care to leave the nasal tube in place for a longer period a



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Fig. 5 Photograph of back on 9th postoperative day The wound besled without infection and w thout exophag cal leakage.

quickly through the esophagus. There has been some visible constriction at the site of anastomosis and the lumen of the esophagus above this level has been somewhat larger than the lumen below it However dilatations of the esophagus were not done at any time during the first year of life The child s general physical condition has been excellent (Fig 6) and the weight gain has been most pleasing (Fig 7)

At about 1 year of age the child began to have some difficulty with swallowing of solid food and was returned to the hospital for short periods in the 13th

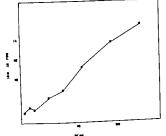


Fig 7 Patient's weight chart for first half year of lif indicating satisfactory gain.



excellent general status.

14th, and 15th months of life at which time the esophagus was dilated respectively to No 30 (French) No 30 and No 41 Following this last and more thorough stretching deglutition has been very satisfactory. When last seen at 20 months of age there was no hesitation in swallowing DISCUSSION

At least five methods of primary anastomosis have been successfully employed for repair of esophageal atresia Each of these procedures has certain factors which recommend it as a valuable approach to the establishment of esophageal continuity in infants. Final evaluation of each method is not possible until larger series are available for study but it is fitting at this time to point out some of the apparent merits or drawbacks of the different forms of anastomosis.

Haight (2,3) has recommended a primary repair whereby the tiny and thin distal seg ment is telescoped for a short distance into the upper segment in such a way that the entire thickness of the wall of the lower segment is joined by interrupted sutures to the mucosa and the submucosal layers of the upper segment (Fig 8a) The muscularis of the upper segment is then lapped over and at tached by sutures to the muscularis and adventitial structures of the lower segment

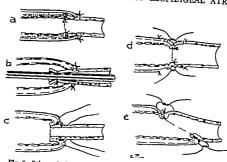


Fig. 8. Schematic drawings of types of esophageal anastomoses. a, Method of Haight. b, Daniel's procedure. c, Humphrey's rechnique. d Ladd's method, employing tension sutures to relieve strain on line of union. e. Operation here reported. Ends of multiple bite sutures are tied opposite ends of these sutures are then being tied to roll in ends of exophagus. Oblique anastomosis.

The outstanding advantage of this method would appear to be in the sleeve-like over lapping of the muscular layers which obviously should give a great deal of strength to the anastomotic repair The greatest draw back with this method would probably be the difficulty of placing the first row of interrupted sutures since the distal segment is usually small quite friable and easily torn. Hence there is considerable chance for the sutures to cut through or pull out, particularly if the segments have to be drawn together under any great tension Aside from any theoretical disadvantages of the method, Haight's ex perience to date shows that in 3 cases a brilliant result has been obtained the babies have not needed gastrostomies and each has been able to take feedings satisfactorily In 2 patients a fistula developed through the back, but each has healed spontaneously In another individual, a tracheo-esophageal fistula reopened Hence in each of these latter 3 cases it is obvious that some portion of the umon had broken down after operation Never theless Haight's reports have shown more recoveries from direct anastomoses than has any other publication to date.1

Since completion of this manuscript one of ms (R E G) has attempted went more operations for enophagual attents by the Haight technique, so of these Ada survived and at the moment we feel that this is the manuscript of the moment which is the statement in bubble 11 in

Daniel employed an ingenious method for the surgical union of the two segments in esophageal atresia After freeing and opening the upper and lower ends a catheter was placed in the nose led down through the upper segment, and threaded through the lower segment into the stomach. This catheter was used for upward traction after the esophageal end was tied to it. Thus the lower part of the esophagus could be pulled inside of the upper segment, to which it was then anchored with a number of interrupted stitches joining the muscle layers (Fig 8b) The chief disadvantage with this procedure would seem to be that the esophagus is com pletely obstructed until the encircling ligature breaks or until it cuts through the esophageal substance During this period of total obstruction saliva can accumulate and possibly spill over into the larynx and trachea. Some of this difficulty might be obviated by very careful nursing care during the postoperative period, so that any accumulated fluid could be frequently sucked out of the mouth and pharynx. It must be pointed out that Daniel was able to overcome a defect in which there was a very long separation between the two esophageal segments. Whether or not such a method will be productive of a higher percent age of strictures at the anastomosis site is as

It is needless to emphasize that great delicacy must be employed in the performance of esophageal anastomosis in babies. The tissues particularly of the lower segment, are extremely fragile and are easily injured Every effort should be made to handle them with utmost gentleness and to avoid squeez ing them with hemostats forceps, or other instruments The stay type of suture advised by Ladd provides an admirable handle for traction and for manipulating the esophagus When one of these stitches has been placed all subsequent sewing can be accomplished without grasping the esophagus with a metal he instrument. In the case here reported it seemed to us of considerable importance that the esophagus was not touched with forceps more than three or four times during the entire surgical procedure To complete such tiny operations successfully it is necessary to have a few instruments of diminutive size. A small blunt periosteal elevator or a septum elevator-dissector is essential for stripping the parietal pleura from the thoracic cage and the mediastinal structures Tissue forceps should be no more than 3 or 4 inches in length and should have delicate toothless points Scissors may be curved or straight, but should be no more than 3 or 4 inches in length. Of prime consideration is the type of suture material and the needle upon which it is threaded. We believe that fine braided silk is superior to any other type of suture material Size No 00000 has adequate strength and a very small caliber When attached to a No 9 Deknatel atraumatic needle, it makes a superb ma ternal for use in bables

The choice of anesthetic agent must of course depend upon the circumstances in a given clinic. Local novocain infiltration has been frequently employed avertin plus novocain has been frequently employed avertin plus novocain has been favorably commented upon in some instances ether has been preferred Various authors have condemned general anesthesia but we are convinced that it greatly facilitates the performance of the operation and need not be productive of shock or untoward reaction. In the case here reported and in other instances in this hos pital cyclopropane has been the anesthetic of choice. It gives sufficient relaxation and

carries a high concentration of oxygen When supplied through a tightly fitting face mask it can be given under positive pressure if by accident the parietal pleura should be pierced at any time the lung can be easily expanded. Our selection of cyclopropane has been dependent upon the availability of an expert anesthetist who has had wide experience with its use in babies. Where such conditions do not prevail local anesthesia would probably be safer.

Discussion has arisen concerning the ad vantages of leaving a small rubber tube in the reconstructed esophagus. In our case a No 8 French catheter was led through the nose, down through the esophagus and into the stomach-and kept there for 8 days. We considered it to have value as a semi rigid structure for keeping the segments of the esophagus in line Furthermore it was enor mously useful for feeding purposes during the immediate postoperative period ably an inlying catheter can produce pressure necrosis in the anastomotic area, but we are inclined to minimize this danger Previous experience indicates that some infants will tolerate a tiny rubber tube in the nose for protracted periods of time while others de velop such a violent reaction to it that nasal stuffiness and accumulation of secretions greatly embarrass the baby a breathing. In short if a catheter is tolerated well it is probably a valuable therapeutic agent however too much reaction is set up in the nose or throat it is folly to keep a tube in place

The use of a gastrostomy is likewise a moot point. In the present case gastrostomy was performed 8 days after the esophageal repair but it was kept open for only a week. This patient fared so well that possibly he could have survived without the gastric opening In 3 of Haight a patients no gastrostomy was employed. In general, it would seem to us that the establishment of a Stamm gastrostomy under local anesthesia can be such an innocuous procedure that it should be almost universally done a day or two after the esophageal repair the inlying esophageal cathe ter could be omitted and all oral feedings could be withheld for several weeks in order

to allow the best possible esophageal healing While this routine would obviously impose a gastrostomy on some patients who might have survived without it there would doubtless be improvement in overall results when em ployed in a series of cases

The necessity for esophageal dilatations and the frequency with which they must be re peated will depend upon the tightness of any existing stricture and the severity of the dysphagia The size and the function of the exophageal canal can be observed by a swallow of barium (or lipiodol) and fluoroscopic examination. However we are convinced that esophageal dilatations should not be performed solely on the basis of any roent genologic findings which suggest a constriction at the site of anastomosis. Indeed, the in dications for dilatation should depend almost entirely upon the subjective symptoms which occur during the ingestion of feedings. One gains the impression that scar tissue (if not too great) at the site of an anastomosis may give trouble for a temporary period, but that the symptoms can become much less as the child grows older and the esophageal lumen becomes greater In short the lesser degrees of stricture may be troublesome at first, but they do not necessarily imply that dilatations will be required indefinitely

Observations are reported upon a baby with congenital atresia of the esophagus and associated tracheo-esophageal fistula. Surgical correction was undertaken through a right, extrapleural mediastinotomy esophageal fistula was closed and the two esophageal segments then joined by a long The baby was discharged from the hospital 19 days after operation Esophageal dilata tions were not required during the ensuing year but were performed thereafter The child is in excellent health at 30 months of age. The surgical method is one which can be employed only when the esophageal segments he close to one another or when they can be adequately mobilized to allow satisfactory approximation. Under such circumstances,

# the technique merits further trial in future REFERENCES

DARTE, R. A. Jr. Ann. Surg., 1944, 180 744.
2. Hauger C. Ann. Surg., 1944, 180 744.
3. Hauger C. and Surg., 1944, 180 634.
1943, 76 672. Townstry, H. A. Surg. Gyn. Ob.
4. Henders C. Jr. S. 104.5 76 672.

4. HUNERATE, G. H. SERREY, 1944 15 507

5. LUNEW, E. N. Dogland J. 1944 15 507

6. LUNEW, F. H. Arck, Sorg, J. 1944, 197 665.

7. LUTER, N. L. J. Thorac, Sorg, 1944, 10 648.

8. STAW, R. J. Thorac, Sorg, 1939, 9 21,

9. Voor, E. C. Am. J. Roents, 1929, 22 453.

# PANCREATIC HETEROTOPIA

Review of the Literature and Report of 41 Authenticated Surgical Cases, of Which 25 Were Clinically Significant

JORGE J DE CASTRO BARBOSA M D MALCOLM B DOCKERTY M.D., and JOHN M WAUGH M.D., F.A.C.S., Rochester Minnesota

HE presence of pancreatic tissue in an aberrant location, without connection with the main pancreas can at the present time no longer be considered merely as a rare and casual post mortem discovery or as an unusual and interesting but incidental finding at operation. In view of the multiple surgical cases of clinical significance reported in the medical literature it is a condition that should be kept in mind, recognized, and taken into due consideration by the surgeon who operates on the surrointestinal tract.

In the past 5 years there has been an in creased interest, both of the clinician and of the surgeon in conditions referable to the pancreas. Much study has been done in various sectors in this field. Much of this work has been dedicated to the clinical study and surgical treatment of hypoglycemia and hypermaulinism There have been examples reported in which aberrant pancreatic tissue was the site of hyperfunctioning insulinproducing, benign or malignant neoplastic there. The presence of a functioning aberrant alet cell adenoma or adenocarcinoma can possibly explain the enigma of some cases of idiopathic or so-called spontaneous hypoglycemia, in which an exploration does not reveal the presence of any tumor in the main pancreas.

Aberrant pancreatic nodules have at cer tam times caused embarrassment to the surgeon At other times far from being merely an incidental finding heterotopic pancreatic tissue has been known to be the

source of considerable trouble and to be the cause of serious conditions for which a major surgical procedure had to be instituted to obtain relief

The collection of cases in the literature especially in the more recent years, has been illustrative and revealing. The reports how ever have all been accounts of isolated in stances and no large group of cases has yet been presented from one single source the largest series being that of Branch and Gross, who presented 24 cases in only 5 cases however was heterotopic pancreatic tissue encountered at operation and in only 4 was it causative of symptoms.

In an endeavor to make a substantial contribution to the casuistics of this subject we have attempted to make a detalled clinical and pathologic study of all the surgical cases of pancreatic heterotopia found in the records of the Mayo Clinic. There is a relatively large group of cases with clinical significance especially in the more recent years.

#### MATERIAL AND METHODS

We reviewed a series of 82 surgical cases. Twenty five of these were authentic cases (confirmed by microscopic examination) of pancreatic heterotopia in which the heterotopic pancreatic tissue was clinically significant, in that either it was found to be the only or main lesion for which the patient was taken to the operating room or it was one of the lesions contributing to the production of symptoms. These cases are summarized in Table 1

Sixteen cases of the series were authentic cases of pancreatic heterotopia in which the heterotopic pancreatic tissue was merely found incidentally at operation during the course of a surgical procedure performed for some other lesion

Abrigment of thesis submitted by Dr. Barbosa to the Faculty of the Gradeaute School of the University of Minnesota in partial self-liment of the requirements for the degree of M.S. in Surgery Iron the Division of Surgery Mayo Foundation, and the Scribe an Sorgical Pathology and the Division of Surgery Mayor Foundation, and the Mayor Clinic.

TABLE I -SUMMARY OF AUTHORS 15 SURGICAL AUTHENTIC CASES OF PANCREATIC HETEROTOPIA WITH CLINICAL SIGNIFICANCE

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Fourteen cases were unconfirmed cases of pancreatic heterotopia which we interpreted as clinically significant The heterotopic pancreatic tissue diagnosed grossly as such by the surgeon in these cases, seemed to be the

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Twenty seven cases were unconfirmed cases the symptoms present.

TABLE II -CASES OF PANCEBATIC HETEROTO-PIA RECORDED IN THE LITERATURE SINCE FAUST AND MUDGETT'S REVIEW IN 1010

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	A STATE OF THE STA	Spices (cyst) Storacti (FO)†	
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	Dergains (en)	Liver (Ca, Lee )†	$\overline{}$
	Racid and Walten	Contraspinac concertant	
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	Mancastra and Vines		1
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of pancreatic beterotopia in which the beterntopic pancreatic tissue diagnosed grossly by the surgeon as such, was found incidentally during the course of an operation performed for some other surgical condition and was thought not to be of clinical algorificance

#### GENERAL CONSIDERATIONS

Definition Pancreatic heterotopia is defined as being the presence of pancreatic tissue outside its usual or habitual location and without anatomic relation either of continuity or of vascularization with the Dancreas proper

Literature A complete review was made first of the early literature and second of the recent literature (Tables II and III) As precisely as we can determine, from 1727 to March, 1044, approximately 430 cases have been recorded in the literature to which we add the cases of our series (Table III) which includes at authentic cases and at unconfirmed cases.

Embryology and hypotheses of origin Areg gave a very clear description of the organogenesis of the pancreas. The classical descriptions are generally in agreement as far as the number and general topography of the pancreatic anlagen are concerned. They differ however when it comes to describing the phases through which the anlagen go in order to form the definitive pancreas. In 1030 Delmas presented his findings after following the evolution of the pancress on reconstructions made by Born's method on human embryos from 5 to 27 milhmeters in length Delmas concluded that the total pancreas is completed at the 27 millimeter stage According to his research, which was the most recent and thorough work that we found on this subject, the dorsal pancreas forms the head of the pancress (primitive dorsal anlage) and the body and tail of the pancreas (bud from the dorsal anlage) The ventral pan creas forms the preduodenal process the pancreas minor of Winslow and reinforces the dorsal part of the head of the pancress. The ventral pancreas is the only anlage that tends to encircle the duodenum

Practically all the concepts of the etiology of heterotopic pancreatic tissue maintain that

BARBOSA ET AL PANCREATIC HETEROTOPIA

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Brusch and Organ is 1933 reported 14 cases of their own bridges an additional to bross the literature.

Brusch and Organ is 1933 reported 14 cases of their own bridges are short information of the literature of Total cases Infividual contribution

this anomaly is antenntal in origin. It is evident that one single concept does not ex plain all cases however much basis of truth it possesses Our attitude in regard to these hypotheses is eclectic. Of those concepts presented three deserve mention for being the ones that seem most logical to us and that are based on embryologic knowledge namely, Horgan s, Lordy s and Warthin's concepts. Horgan expressed the belief that before the coalescence between the two anlagen takes place during the partial circumrotation of the posterior and anterior pancreatic anlagen, when there is a migration of the body upward

the branching ducts, as a result of the organs being packed together come into contact with the walls of the mesentery, stomach, or in testune growing in the opposite direction On these they become engrafted because of noninflammatory adhesions of fetal life Later during the growth and movements of the gland the attached part is pulled off and may continue to live incorporated as a graft in the gastric duodenal or intestinal wall or mesentery The germinative cells, from which all the histologic units of the pancreas can develop are present in these buds or attached portions derived from the primitive anlage

TABLE IV -INCIDENCE OF HETEROTOPIC PAN CREATIC TISSUE IN CONSECUTIVE NEC POPSIES

Anthor	Nacropules perfermed	Haterologic pancressis tuness, cases	Per cont		
Oper	1,800	20	•		
Horgan	2110		4		
McGalt	1,970		-		
Dechyshbre	401	F84			
Kreser	457	•	,		
Katamada	279	•	•		
Feytter( 7,35)	2,100	1	3		
Meschet	800	•	1		
Latuelle	30		16		
Clinic perym 930	185	6			
940	174	10	1		
101	444		4		
1042	Eraj				
143	63.0	10	•		
Total†	,751	48	1		

Entire gastrolateathed tract opened in 114 cases,

This graft may find suitable environment and continue to live and develop into a small separate piece of pancreatic tusue consti tuting a pancreatic heterotopia with all the functions of the normal pancreas.

Lordy explained the presence of an acceasory pancreas by stating that it is due to persistence or incomplete regression of the left ventral anlage which is normally destined to atrophy Warthin described his concept of the origin of pancreatic beterotopia as follows

It is probable that accessory pancreatic tissue is formed from lateral budding of the rudimentary pancreatic ducts as they penetrate the intestinal wall, the mass of pan creatic tissue thus formed being snared off and carried by the longitudinal growth of the intestine either upward or downward.

Incidence The incidence of heterotopic pancreatic tissue not only at necropsy but at operation was studied from reports in the literature and from our own findings in the -urgical records and those of the Section on gic Anatomy of the Mayo Clinic. It

· that the incidence at necropsy varies

TABLE V -- PRECISE HISTOLOGIC LOCATION OF THE HETEROTOPIC PANCEEATIC TIESUE IN 26 CLERS

** ***				
THE PERSON NAMED IN COLUMN 2 I	-	CHARLES		-
Cocacien	Bysep- Leann	No symp- toms	Tetal	Per Cent
Is subsences only	0	•	и	14
In subsection and inditrating muscular fibers	3		•	
Detween messele Slotes only			_	
On the substruct or serous!			,	
In the arturnment between the mencie fibers and in the pub- seronal tappes				
Tere				

from 0 6 per cent to 5 6 per cent of soutme necropsies (Table IV) At operation heterotopic pancreatic tissue is found once in anproximately every 500 operations in the upper abdominal region.

There is a higher incidence of surgical cases in the fourth, fifth, and sixth decades of life than in other decades but the anomaly has been found in patients of all ages both young and old including infants and newly born. In our series the youngest patient was 4 months and the oldest patient was 64 years

Location We particularly endeavored to determine the usual and unusual locations of pancreatic heterotopias. The duodenum stomach, and jejunum are the most common sites with an incidence for the three sites of elmost 70 per cent 27 7 per cent for the duodenum, 25 5 per cent for the stomach and 15 9 per cent for the jejunum (Table III) All the other unusual locations are mentioned in Table III.

Morphology Heterotopic pancreatic tusue usually presents itself as a single, firm and, when visible yellowish (light yellow or cream color) or white opaque lobulated round, or irregular node with granular surface. The maximal diameter of the node is usually 1 to 4 centimeters. Its appearance is like that of the pancreas itself or of a salivary gland. Larger masses may be found (Fig 1)

The histologic picture of heterotopic pen creatic tissue is frequently the same as that of the pancreas itself with acini forming lobules with ducts and islands of Langerhans (Fig

TABLE VI.—SUMMARY OF 6 CASES\* OF PANCREATIC HETEROTOPIA ASSOCIATED WITH HYPO-GLYCEMIA AND HYPERINSULINISM, COLLECTED BY THE AUTHORS FROM REPORTS IN THE LITERATURE

Case transfer and author	Patient, sex and age, years	Symptome	Operative findings	Pathologic facilitys	Results
Veccial spi4 (one case)		No clinical history Hyperin- milinium?	Large tumor near tall of pas- cress	Large lalet cell tumor (sonlig- nent adecoma) arising in accessory pancress	
s. Fanta 937 (case case)	Male 37	*Hypoghycamia and hyper- chlorhydria	Reserval of walnut sized nodels of abservant pancreas in deode- nom	Heterotepic pencreatis tisme, not adenomatous	Partial relief from symptoms
s. Meyer May Apr 1937 (one case)	Fernale st	Hypergycenia, Loss of weight Abdomical tensor Rossi- genograph suggested tensor between stonech and colon- pancreatic cyst?	with communication with ny-	rent intragastric peacress (coltis) constorn messes with	Recovery
dos Amg , 037 (see case)	Female 33	*Hypoglycards. Four spinodes montal confusion, restless- ness, leadance, durings and transloling. No result with modical treatment	side pancreas, in connective tissue surrounding it. No	with falet cell these. No	Complete refiel Gain in weigh
g. Bullinger Aug. Q4 (one case)	Male 53	*\ erylow bypoglycenia (proved aperifically not to be impato- gonic) Fasting—mental con- trains and faintness, conva- tions and comm (were with metatases)	upper border head of pancrees and spignism lobe of liver-	nome of aberrant pastreatic tisses in liver containing hyporhyppis-productor sub-	pisedes a-
6. Ruschi and Wal- ton Oct., 194 (one case)	Mal 20	*Stopos—unconscious with low blood rugar level. Dramatic recovery with glucuse (Park- tuson's syndrome). Hypo- glycemia	restreet. First, retted. 1.	BET(ACE)	Physical and mea tal improve ment. Normal gl use toler ance test
y Smith Feb 04 (one case	Female 45	Weakness faint. Appetits for sweets. Hypoglycemas Ra- Bel of symptoms with food	ecrodane doodestara	Nodels ext can g cm. Weight g ma. with actal, ducts and diffuse latet cells (not ade- nomatous)	Nob r
# H Im W d C Stockton Ang 943 ( nodules.		Direiness and weakness with backequate (seeding and strain Intermittent episodes of acute mental upset, irresponsive- ness and toms. Hypoglyca- mia	birden module scar and of talk of pancress, together with a portion of pancress, and	mefale: Islet cells module can in distracter	No relief from first operation. Patient well yr, after second operation
M d Stockton Ang 943 (one case		Neds found incidentally	Node in proximal deedsman found incidentally during nec- rappy following death from personnia	Subrences hilet cell adenoma	Died

"This table the incindes Vector's case, as well as one case of inlet cell denome without hypoglycemia and one case of inlet cell cystadenocarcinema with hypoglycemia, from the interators.

 There may however, be a lack of one or another histologic element of the normal pancreas.

In the majority of the cases reported as well as in our own cases the type of mu cosa directly overlying the heterotopic tissue is the same as the type of mucosa nor mally corresponding to that particular por ton of the gastrointestinal tract where the heterotopic pancreatic tissue is situated. We were not convinced of any direct relation continuity or transition between the glands and ducts of the mucosal epithelium and the actini and ducts of the heterotopic pancreatic

tissue The only possibility of indirect con nection would be by means of the excretory ducts of the heterotopic pancreatic tissue emptying into the lumen of the gastroin testinal tract through the ducts of the mu cosal epithelium. The commonest histologic location of heterotopic pancreatic tissue was found to be the submucosa alone with an in cidence of 53.8 per cent. The second most common type of involvement was infiltration between the longitudinal or circular muscular fibers or both, with an incidence of 33 per cent. The least common location was the seroesal surface (Table V)

TABLE IN —INCIDENCE OF HETEROTOPIC PAN CREATIC TISSUE IN CONSECUTIVE NEC ROPSIES

<u>A-the</u>	Vecrepaire performed	Heterotopic pancreane tame, case	Per cent
O <del>pla</del>	z,£on	10	•
Horgan	3114		•
71-020	1,070	11	
Derbyshire	8,013	191	
Krewer	467	6	1
Kateurada	129	-	.3
Feynter(17,1%)	1,100	23	,
Mouchet	<b>200</b> 0	3	3
LetusDe	150	13	16
Clink series 1839	121	•	
1840	g75	19	7
taut	454	11	-
1943	513	11	
P43	63	ь	-
Total†	2,735	<b>E</b>	7

\*Endre gestrobusednel tract opened to 514 cases. (Of clane stress.)

This "graft" may find suitable environment and continue to live and develop into a small separate piece of pancreatic tissue constituting a pancreatic heterotopia with all the functions of the normal pancreas.

Lordy explained the presence of an ac cessory pancreas by stating that it is due to persistence or incomplete regression of the left ventral anlage, which is normally destined to atrophy. Warthin described his concept of the origin of pancreatic heterotopia as follows. It is probable that accessory pancreatic tissue is formed from lateral building of the rudimentary pancreatic ducts as they penetrate the intestinal wall, the mass of pancreatic tissue thus formed being suared off and carried by the longitudinal growth of the intestine either upward or downward."

Incidence. The incidence of heterotopic pancreatic tissue not only at necropsy but at operation was studied from reports in the literature and from our own findings in the surgical records and those of the Section on Pathologic Anatomy of the Mayo Clinic. It is seen that the incidence at necropsy varies

TABLE V —PRECISE HISTOLOGIC LOCATION OF THE HETEROTOPIC PANCREATIC TISSUE IN 26 CASES

Location	Bymp- toms	tem	Tetal	200
In submicons only	•	3	14	54
In subcracous and infiltrating crascular fibers	5			21
Between muscle fibers only			\	3
On the subserona or seronal surface only			,	
In the submittees between the smooth above and in the sub- second theme				
Tetal	rŝ	3	#5	100

from 0.6 per cent to 5 6 per cent of routine necropies (Table IV) At operation heterotopic pancreatic tissue is found once in approximately every 500 operations in the upper abdominal region.

There is a higher incidence of surgical cases in the fourth, fifth, and sixth decades of life than in other decades but the anomaly has been found in patients of all ages both young and old, including infants and newly born. In our series the youngest patient was 4 months and the oldest patient was 64 years of age.

Location We particularly endeavored to determine the usual and unusual locations of pancreatic heterotopias. The duodenum, stomach, and jejunum are the most common sites, with an middene for the three sites of almost 70 per cent 277 per cent for the duodenum, 25 5 per cent for the stomach, and 15 9 per cent for the jejunum (Table III) All the other unusual locations are mentioned in Table III.

Morphology Heterotopic panacratic tissue usually presents itself as a single firm and, when visible yellowish (light yellow or cream color) or white, opaque lobulated, round, or irregular node with granular surface. The maximal dismeter of the node is usually 1 to 4 centimeters. Its appearance is like that of the pancreas itself or of a salivary gland. Larger masses may be found (Fig. 1)

The histologic picture of heterotopic pan create tissue is frequently the same as that of the pancreas itself with acid forming lobules with ducts and islands of Langerhans (Fig

#### BARBOSA ET AL. PANCREATIC HETEROTOPIA

TABLE VI.—SUMMARY OF 6 CASES OF PANCREATIC HETEROTOPIA ASSOCIATED W
GLYCEMIA AND HYPERINSULINISM, COLLECTED BY THE AUTHORS FROM KEL
LITERATURE

			1	1	
Case number and author	Patient, sex and age, years	Bymptoms	Operative Andlage	Pathologic findings	
I. Verrbl 1914 (nee case)		N clinical history Hyperia- salinism?	Large turnor near tail of pan- crees	Large islet cell tensor (malig- ment admissions) arising in accusacy pancreas	
Fanta 1937 (ene case)	Mai 37	Hypoghycenia and hyper- chlorhydria	Removal of walnut sized audule of abstrant pascress in duode- pain	Heterotopic pancreatic tissue, not admonateus	P
Apr 1937 (one case)	Fernale 18	Hyperghyoreds, Loss of weight Abdominal tensor Romt- genogram suggested turner between storacch and colon- panorsatic cyst?	with communication with ny-	cells his Langurhans cells).	1
4. White and Gil- des. Aug., 937 (one case)		*Hypoglycania. Four episodes meetal casfusion, recties- ness, leadurie, disriness and tresibiling N result with medical treatment	thems surrounding it. No	with falet call times. No reltatic flaures	٦
5. Ballinger Aug. 1941 (one case)	Mala 13	eVerylow hypoglycania (proved specifically not to be hepato- penic) Fasting—mental coo- tosion and faintness, convol- sions and come (worse with metastasse)	retroperatoreal area between repper border head of pancreas and spigulian lobe of liver.	nome of abscreat pencreatic times in liver containing hyportecasis traductor sub-	3
6 Rudd and Wal- ton Oct., oct (one case)		*Stapor—anconscions with low blood sugar level. Dezmatic recovery with gincoss (Park- linson's syndroms) Hypo- glycenia	turn com. from the of tall of	Islet admona (phak on cut aurface)	Phys (a)
7 Smith Feb. 94s (one case)		*Weakness—faint. Appoints for sweets Hypoglycema. Re- Bel of symptoms with food	scrodung dradenum	Nedale sxr goog cm. Weight r g gm. with actal, ducts and drives lalet cells (not ade- somatous)	) Clai
S H lm W d Sacktes Asg. 943 ( podules)		Dizzinoss and weakness with landcognate (seefing and strain latermatical episodes of acute mental upset, irresponsive- ness and come Hypoglyca- mia	bitisk notice near end of tall of paneress, together with a portion of paneress, and	st medale: Islot cell adenome, 7 cm in diameter sed medale: Islet Cells; module cm in diameter	No firs Pat Fr
p H lm W d c Stockten Aug- 943 (one case)	-	Node found incidentally	Node in proximal duodename found incidentally during nec- ropsy following death from peritonius	Submannes falet cell adenoma	Died

\*This table also includes Verchi's case, as well as one case of falst cell adenous without hyporlycenia and one case of falct cell community byporlycenia and one case of falct cell community byporlycenia, from the interstore.

 There may, however be a lack of one or another histologic element of the normal bancreas

In the majority of the cases reported as well as in our own cases the type of mu cosa directly overlying the heterotopic tissue is the same as the type of mucosa nor mally corresponding to that particular portion of the gastrointestinal tract where the heterotopic pancreatic tissue is situated. We were not convinced of any direct relation continuity, or transition between the glands and ducts of the mucosal epithelium and the acini and ducts of the heterotopic pancreatic

tissue The only possibility of indirenection would be by means of the aducts of the heterotopic pancreatic emptying into the lumen of the testinal tract through the ducts of tosal epithelium. The commonest location of heterotopic pancreatic found to be the submucosa alone, cidence of 53.8 per cent. The seconomom type of involvement was between the longitudinal or circular fibers or both, with an incidence of cent. The least common location serosal surface (Table V)

TABLE VIL—PRODUCTION OF SYMPTOMS BY THE HETEROTOPIC PANCREATIC TISSUE, ACCORDING TO ITS LOCATION IN THE STOMACH, DUDDENUM OR JEJUNUM IN 27 AUTHENTIC AND 37 UNCONFIRMED CASES FROM AUTHORS SERIES OF PANCREATIC HETEROTOPIAS, IN WHICH THE FOREGOING LOCATIONS WERE FOILING

Lacetton	With symptoms			Without symptoms			
	Anthonis Ctom	Unconfirmed cases	Total	Authentia	Unconferred Class	Tetal	Total
Statuck*	•	1		4		•	1
Dondesson†	6		18	4	,		30
Jekmat				1	•		10
Total	1	14	**		- 13	31	a.

There was also one case of pencrettle those in gestric divertication (with symptoms).

There was also one case of pencrettle those in depleted divertication (with symptoms)

Physiology Special staining methods were utilized to determine whether or not heterotopic pancreatic tissue secretes enzymes. Mallory a (16,17) phosphotungstic acid he matoxylin stain was most satisfactory Histologic evidence of acinar function in our cases was present in 76 per cent. In these cases, refractile zymogen granules could be seen in the anex or base of the acinar cells or scattered all over inside these cells (Fig 3) An investigation was carried out in order to deter mine what influence this external secretion could have on the gastric acidity. As a result of the analysis of gastric contents in our cases. we cannot conclude that there is any significant deviation to indicate alkalinization of the gastric acidity brought about definitely by functioning heterotopic pancreatic tissue in the stomach wall. We did not carry out a histologic study with any special staining methods for types or functional activity of cells in the islands of Langerbans but we have no reason to disbelieve in the functional activity of the lalets of normal appearance in heterotopic pancreatic tissue We wonder whether heterotopic pancreatic tissue may not, to a certain crient, constitute a some what similar circumstance to a graft of a small fragment of pancreatic tissue.

It is of great practical importance, especally to the surgeon to note that hyper
insulnism and hypoglycemis have been
observed associated with extrapancrentic,
insulin-producing liste cell adenomas and
adenocaronnas (Table VI) If therefore
exploration is being carried out in a case of
hypoglycemia with definite 'Whipple's essential triad" and after a thorough search,
no tumor is found in the pancreas, the sur
even should look for beterotone pancreatic

TABLE VIII.—FORTY THREE CASES OF PANCREATIC HETEROTOPIA COLLECTED FROM THE LITER ATURE BY POPPI IN 1935 IN WHICH SYMPTOMS WERE PROVED AT OPERATION TO BE PRO-DUCED BY THE HETEROTOPIC PANCREATIC TISSUE

	Location of honostopic pascreatic theore					!
Clinical diagrams	Stomach	Duotanes	Jejemest	Callbladder	Mechal's	Total
7 cases gastric or disoleral nicer 50 55%	,	1				Lan
to cases pastropathy as 1%	•					Tt.
teres chelefthinds, hapatic colic or right apper quadrant syndrome 6 77%	,	,				,
g Cases pyloria sacplana so.23%						<u> </u>
Total	14	1		<u> </u>		

"Only the so case in which no show was found are included.

These two noise accusant for the total number of 37 instead of 43 manticeed in the title of the

Time case the location was both generic and 4 moderni. These two noise accusant for the total number of 37 instead of 43 manticeed in the title of the



Fig 1 Case 22, Table I. Mass of heterotopic parcreatic fissue removed from the mesentery of the transverse colon. Its dimensions were as f licros length to continueters width largest (globular end) 4.5 centimeters, smallest (eck) 5 centimeters thuckness, 5 centimeters, smallest (eck) 5 centimeters thuckness, 5 centimeters, of heterotopic pancreatic fussue. The cyst contained stones (largest amm.) and sandy material. Gressly at operation the mass gave the impression of a lymphosarcoma r of toberculosis of lymph nodes.

tissue in its most common locations and also in such of the unusual sites as permit exploration

Pathology Pathologic changes have been found in heterotopic pancreatic tissue itself in the surrounding tissues or in both Heterotopic pancreatic tissue presents the same pathologic changes as the pancreas namely cysts pancreatitis hemorrhage necrosis, and neoplastic change (benign and malignant) Data on 3 cases of cyst formation in heterotopic pancreatic tissue are presented in Table I (Fig. 4). An investigation was carried out to determine the presence of dilatation of the ducts in pancreatic dystopias. The ducts were

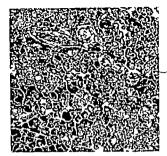


Fig. 2 Case 1 Table I Portion of a mass of heterotopic parcratic tissue measuring 3 5 by 3 by 1 5 centimeters on the posterior wall and lesser curvature of the stomach, showing acun and islands of Langerhans. Hematoxylin and cosin. X88.

found to be dilated in a large number of cases Both benign and malignant changes in heterotopic pancreatic tissue have been observed We feel that malignant change is more likely to take place in heterotopic pancreatic tissue than in the normally placed pancreas The heterotopic pancreatic tissue is not always completely formed and differentiated Both benign and malignant change would possibly be more likely to take place in an incompletely developed and less differentiated tissue in an aberrant location where it is subject to irritation than in a normal tissue in its iisual site. There have been cases in the literature in which the malignant change had its origin traced back to heterotopic pancreatic tissue It seems that there is little basis to believe in any connection between heterotopic pan creatic tissue and the histogenesis of car cmoids

Pathologic changes sometimes occur in the tissues adjacent to the heterotopic pancreatic tissue namely fat necrosis inflammation hemorrhage ulceration and diverticulum for mation. All the foregoing pathologic changes were studied fully especially ulceration of the mucosa overlying the dystopic pancreatic tissue which may be the cause of gastroduodenal ulcers in a small number of cases. In such cases conservative surgical treatment



Fig. 3 Case Table I Portion of a mass of heterotopic paracreatic tissue 1 th stomach wall Staining method hailtowys phosphoth gatic acid hematoxylin stain, ith oil immersion lens. 8 53. The individual symogra granules can be seen getomerated at the apex of the acids a cells.

is indicated namely simple local excision of the ulcer together with the underlying misplaced pancreatic tissue mass. Data on a cases are presented in Table I. Formation of a diverticulum brought about by heterotopic pancreatic tissue was studied data on a cases in which symptoms were caused by these lessons will be found in Table I.

Clinical significance In 25 (6) per cent) of the 41 authentic cases of pancreatic heterotopia the heterotopic pancreatic tissue was proved at operation to have been the only



Fig. 5 Case. Table I Mass of beterotope pancratile those measuring 3.5 by 3.5 commonters on the lesser curvature and posterior all of the stomach giving a rentgrenologic luster of an ovoid mass, in midporting a stomach, its malignant nature could not be excluded reentgenologically.



Fig. 4. Case 6, Table I Vlew from the serosal sid of portion of gastric wall, measuring 7,5 centimeters in diameter (excited—ith cautery) containing an intramural mass of heterotopic pancreaite tissue, measuring 3 by—centiscetters. Cytis can be seen grossly in the onocreatic tissue,

lesion the principal lesion or at least one of the lesions causative of symptoms for which the patient was submitted to surgical inter vention. Of the 25 authentic cases in which there were symptoms, it was seen that in o (36 per cent) the heterotopic pancreatic tissue was located in the gastric wall. The incidence in this location in all authentic cases, with or without symptoms was 31 7 per cent. In 6 (24 per cent) of the cases in which there were symptoms the location was in the duodenal wall. The incidence in this location in all authentic cases was 24.4 per cent. There were no cases with felunal location presenting symptoms but the incidence in this location in the authentic cases without symptoms was approximately to per cent (Tables VII and VIII) For the cases in which heterotopic nancreatic tissue occurred in other locations see Table III In most of the cases of pancreatic heterotopia in which there were symptoms, the location was either gastric or duode nal Proportionately the cases of beterotopia with gastric location contribute more than the ones with duodenal location to the number of cases with symptoms. In 13 cases reviewed there was persistence of symptoms possibly because of failure to remove a supposed pan creatic heterotopia at operation.

Symptomatology There is no single symptom complex for pancreatic heterotopia. The symptoms, of course vary according to the



Fig. 6. Case 1 Table I Mass of heterotopic pancreatic tissue measuring 3 5 by 3 by 1 5 centimeters on the lesser curvature and posterio wall of the stomach. The patient gave a history simulating that of duodenal ulcer and a loss of weight. The tumor was mistaken clinically roentgenologically and at operation for an adenocardnoma of the stomach. The tumor had been sectioned for examination when this picture was taken

different locations in which heterotopic pan creatic tissue may be found. The symptoms produced however are generally similar to those produced by gastroduodenal lesions namely symptoms of gastric ulcer duodenal ulcer pylonic obstruction cholecystitis obstruction of the common duct, chronic or acute appendicitis or indeterminate digestive symptoms The group of authentic cases in which there were symptoms was reviewed in subgroups divided according to location and the complication or disturbance that the anomaly caused There were 10 authentic cases of pancreatic heterotopia with a gastric location and presenting symptoms which were caused by the heterotopic pancreatic tissue as proved by the relief of the symptoms after its removal Data on 6 cases are presented in Table I (Figs. 5 6 7 8 and 9) There were 7 authentic cases of pancreatic heterotopia with duodenal location and presenting symptoms



Fig. 7 Case r Table I Heterotopic pancreatic these mass, showing pancreatic tissue extending between the muscular bundles. Grossly the tumor seemed to infiltrate the muscular coat of the stomach. Hematoxyiin and coan. Xro.

which were caused by the heterotopic pan creatic tissue as proved by the relief of symptoms after its removal in practically all the cases Data on 3 cases are presented in Table I (Fig. 10)

Among our 10 cases of pancreatic heterotopia with a gastric location there was 1 case in which pyloric obstruction was observed

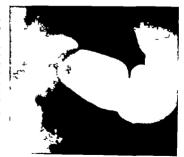


Fig 8. Case : Table I Gastric nodule of heterotopic pancrealite tissue : 5 centimeters in diameter producing a filling defect near the greater curvature just proxumal to the pylorus it appeared like a lefomyoma growly at operation



Fig 9 Case 7 Table I Nodule of heterotopic pan creatic tissue measuring 8 millimeters in diameter in the submucosa of th posterior all of the prepyloric region of the stomach. The overlying gastric mucosa is pitted.

Data on this case are presented in Table I (Figs. 11 and 12) Seventeen cases of pyloric stenosus which were secondary to the presence of heterotopic pancreatic tissue were collected by kneg from the medical literature in 1030 and published in 1041. We found in the literature s additional cases of heterotopic pancreatic tissue causing nyloric obstruction from the time of Knegs review in 1930 up until March, 1944 Krieg mentioned a group of 23 cases of Poppi's series which he interpreted as having been produced by local spasm of the intestinal wall. In his opinion the difference between the cases of stenosis and those of spasm is that of time and the degree of irritation.

Hypertrophy of the muscular coat was evidenced grossly and microscopically in 11 out of 19 authentic cases of our series of pan creatic heterotopia in the gastrointestinal tract. In our series of authentic cases, there were 2 cases of Meckels diverticulum containing heterotopic paneratic tissue. Data on



Fig. 10 Case 3 Table I. Nod le of heterotopic pan create them, measuring 1 5 by by 0 5 centinater in the anterior all of doodenum immediately below pyloris. The mass looked like fibroms grossly 1 operation.

a case of ileal intussusception brought about by an ileal diverticulum containing pancreatic tissue will be found in Table I Data on a case of pancreatic heterotopia in the wall of the gallbladder are presented. This case is of interest in the light of Coln and Doubllet s studies on the clinical significance of pan creatic reflux. Data on a case of obstruction of the common duct caused by heterotopic pancreatic tissue are presented in Table I The possibility of duodenal adenocarcinoma arising in dystopic pancreatic tissue in the ampulla of Vater and in the papilla of Santorini is suggested. A study of the pathogenesis of the disturbances and symptoms caused by heterotopic pancreatic tissue was made The pathologic changes have an influence on the production of symptoms.

Diagnosis The clinical, the roentgenologic the operative and the pathologic diagnosis of pancreatic heterotopia were reviewed. Of the cases in which the heterotopic tissue was in a gastric location the diagnosis of a benign



Fig. 11. Case 8, Table I. Annular mass of heterotopic parcriatic tissue on the serosal surface of the pyloric ring. The roentgemologic report was as follows: Annular lesion involving pylorus, prepyloric area and hase of duodenum, shallow ulceration. Impossible to exclude malignancy.

tumor was made in 50 per cent of ulcer in 20 per cent, and of malignant tumor in 20 per cent. The mass was missed in 10 per cent. In only 1 of the cases in which the location was duodenal was the diagnosis of duodenal tumor made. In all the others the roentgenologic diagnosis of duodenal ulcer was made although in only I was an ulcer actually present. The preciseness of the roentgenologists diagnosis of gastric polyps may be seen from his reports in 6 of our cases in which the masses were of relatively minute propor tions The diagnosis of a gastric or duodenal polyp is the nearest that one can actually get to the precise and final diagnosis made by the pathologist, although in 3 cases of our series the exact nature of the mass was suspected Apparently analysis of gastric contents is of no avail in determining possible alkalinity or reduced acadity of gastric contents due to alkalınızatıon of the gastric juice from pan creatic secretion flowing from heterotopic pancreatic tissue although this possibility should be kept in mind. Gastroscopy might



Fig. 12 Case 8, Table I. Specimen 12 centimeters of stomach and 15 centimeters of deodenium Heterotogic pancreatic tissue forming an annular mass, 3 centimeters in diameter on the serosal surface of the pylone nag. The tumor in the picture is included between the points of the two arrows. It was causing pyloric obstruction and loss of weight clinically roentgenologically and grossly at opera tion it was mistaken for an adenocarcinoms of the stomach

possibly be an aid in the diagnosis by confirm ing the roentgenologic finding or by revealing the tumor to be intramural covered by nor mal mucosa and not ulcerated as in gastric carcinoma When visible on the serosal surface a pancreatic beterotopia is grossly recognizable but there should always be a confirmative diagnosis by the pathologist In 18 surgical cases of pancreatic heterotopia in which a notation was made of the surgeon a impression from gross examination we reviewed the operative diagnosis made prior to the pathologist s report. In approximately 20 per cent the pancreatic heterotopia gave the impression of a malignant lesion. In 50 per cent the diagnosis of a benign lesion was made In a little more than 22 per cent the nature of the mass was recognized correctly as being

TABLE IX - SURGICAL PROCEDURES PERFORMED IN 25 CASES OF PANCEUATIC HETEROTOPIA

S-RUDGE BURGERER	Cases
Blopsy	1
Partial gastrectomy	
Removal of tumor	100
Resection of gangrenous box el (intususception)	
Cholecystectomy	at
Diverticulectomy and appendectomy	
Total	- 5
	_

"Moreoplahintum of an associated passerests cynt as per case cholecystostomy and crybinstates of the hateron of gail-case and in ... case transductional removal of dissertions after and cholecystostomy. Exploration of the properties of the Explorations of the recommon duct was performed in ... case

heterotopic pancreatic tissue. The pathol ogists diagnosis based on examination of frozen sections at the time of operation is essential The correct diagnosis was promptly made in practically all the cases.

Surgical treatment There are two circum stances in which a pancreatic heterotopia may be found at exploration at is either causative of symptoms or it is only an incidental find ing In Table IX we listed the operative procedures performed in 25 cases of our series of pancreatic heterotopia that were clinically significant. In no case was persistence or recurrence of symptoms observed following the complete radical or conservative removal of the pancreatic beterotopia when this lesion was the only cause of the complication and referred symptoms. In some of the cases of our senes a more conservative operative procedure rather than gastrectomy could have been performed probably with equally good final results had it been possible for the surveon to know that he was dealing with a benum lesson. In only a case in our series did a patient die from a complication associated with a pancreatic heterotopia namely ileal intussusception

When the pancreatic heterotopia is located in the stomach or duodenum simple local excision when feasible is sufficient to bring about relief of symptoms. At times careful duodenal reconstruction or pyloroplasty may have to be carried out. Since as is shown by the abstracts of the case records, in most instances a roentgenologic diagnosis of ulcer tumor carcinoma, or polyp was made preoperatively it is understandable why in 10 instances partial gastrectomy was chosen by the surgeon as the procedure to be performed.

It would be difficult to tell by palpation the nature of the lesion and blops, of gastric lesions is at best frequently indeterminate. Therefore by and large with carcinoms so common in the stomach and pancreatic he terotopia so uncommon it would be to the patient's best interest to elect gastne resection Frequently one of the modifications of the Billroth I operation would be possible and indicated when the lesion is found in the lower third of the stomach. In higher lessons a Polya operation or one of its modifications would be suitable

In the presence of a diverticulum associated with heterotopic pancreatic tissue removal of the diverticulum together with the heterotonic tissue is indicated with simple local excision alone or possibly with pyloroplasty or duodenal reconstruction. In the presence of muscular hypertrophy possibly associated with pylone stenosis, excision and pyloroplasty are indicated

Whenever pathologic changes are en countered in other organs with the presence of a pancreatic heterotopia and the former seem to have more to do with the nationt a symptoms than the latter the surreon should not underestimate the potentiality for production of symptoms or actual present clinical significance of the pancreatic heterotopia, complete removal of which should be carried out. The operative procedure advised for pancreatic beterotopia in locations other than the stomach and duodenum is complete but simple extirpation but no generalizations can be made so varied are the locations. One has to depend on one a surgical judgment in the particular case. As far as the pancreatic heterotopia is concerned one can be as conservative as possible. In several of our surgi cal cases of clinically significant pancreatic heterotopia operation had been performed for some other condition prior to admission of the patient to the Mavo Clinic and at a time when the heterotopic pancreatic tissue was not clinically significant. If the heterotopic tissue had been removed at this time the later operation for its removal could have been avoided Whenever heterotopic pancreatic tissue is found in the stomach or duodenum incidentally during the course of an operation

for some other surgical lesion its excision is indicated to avoid future trouble unless the risk of the procedure outweighs the ad vantages of removal A jejunal pancreatic heterotopia found incidentally during the course of an operation for some other condition may be left undisturbed with a fair chance that no complications will be observed subsequently unless such pathologic changes are present that there is a question as to either its present or its future clinical significance The same general rule as the aforementioned one would hold true for pancreatic heterotopia in other locations, although surgical judgment for the particular location varies

#### SUMMARY AND CONCLUSIONS

There are approximately 470 recorded cases of pancreatic heterotopia Pancreatic heterotopia is observed fairly frequently at routine necropsies We found an incidence of 1 case of pancreatic heterotopia in approximately every 500 operations in the upper abdominal region The incidence of pancreatic heterotopia is highest in the fourth fifth and sixth decades of life

The ratio of males to females is almost 3 to The most common location is in the stom. ach duodenum and jejunum where the incidence is almost 70 per cent. In the ma jority of the cases the mass of heterotopic pancreatic tissue is single and its diameter usually varies from 1 to 4 centimeters

The histologic picture of heterotopic pan creatic tissue is frequently the same as that of the pancreas itself The commonest histologic location of heterotopic pancreatic tissue in our series was the submucosa alone. There frequently is intermuscular infiltration the vast majority of the cases there is histologic evidence of acinar function There is no apparent change in the results of analysis of gastric contents associated with a pancreatic heterotopia

Hypoglycemia and hyperinsulinism have been observed in association with heterotopic pancreatic tissue presenting both benign and malignant change in its insular portion. If exploration is being carried out in a case of hypoglycemia with definite Whipple's es sential triad and after a thorough search no tumor is found in the pancreas the surgeon should search for heterotopic pancreatic tissue in its most common locations and also in the unusual sites that are capable of ex-Both adenomas and adenocar ploration cinomas of islet cell type may be present without clinical evidence of hypoglycemia

Heterotopic pancreatic tissue presents the same pathologic changes as the pancreas itself. In many cases the ducts are found dilated Malignant change is more likely to take place in heterotopic pancreatic tissue than in the pancreas proper Pancreatic heterotopia may be the cause of several types of pathologic changes in the adjacent tissues namely fat necrosis inflammation ulcera tion hemorrhage necrosis and formation of a diverticulum

In a high percentage of surgical cases of pancreatic heterotopia (61 per cent of our cases) the heterotopia is found to be of clinical significance The location is usually gastric or duodenal Some of the rare adenocar cinomas of the duodenum may have had their origin in heterotopic pancreatic tissue either in the ampulla of Vater or in the papilla of San The syndromes presented by a pancreatic heterotopia are generally those of gastric or duodenal ulceration cholecystic disease or indeterminate digestive symptoms

The pathologic diagnosis with frozen sec tion technique at the time of operation is of mestimable value A mass of heterotopic pancreatic tissue can be mistaken for a ma lignant growth both roentgenologically and at operation with a consequent unnecessary operation. When the pancreatic heterotopia is clinically significant its simple excision when feasible is entirely sufficient for complete relief of symptoms. When found in cidentally at operation its removal is indicated in the majority of cases.

#### REFERENCES

- AREY, L. B. Developmental Anatomy: a Textbook and Laboratory Manual of Embryology Phila delphia W. B. Saunders Co. 1966.
   BALLINGER, J. Arch. Path. 1941. 32, 377, 385.
   BLACE, W. C., and PACKAND G. B. Rocky Mountain
- M J 1938, 35 859-863 4. Braxell, C. D and Gross, R. E. Arch. Surg 1935
- 31 200-224. CAYOER G Arch Ital chir 1938 5 41 53

- 6 Case records of Massach setts General Housital, N England J M 04 224 774 776 CAZZOLA, ALBERTO. Cli Bologn
- CARROLA, ALBERTO. CE Hologii 040, 6 3 307 8. CHAPRA J L., and MOSSMAN H W Am } Surg 410 a. 60 56-188.
- COLF RALPH, and DOCREET HEAVY A Surg
- 938, 08 241 262 COPPOLA, M. Arch. sc med., 1941 7 49- 4. CRUICKSIANK M. M. Indian M. Gar., 939, 74 74
- 12. Dalmas A. Ann Dalmas L. Ann. at. path., Par. 930, 16 253 255
   Dyrayanira R. C. Studies of Accessory Pancies. Thesis, Graduat. School of the University of Min.
- nesota August, 940. 4 Drift G L. FOSTER H. L. and BRYLY W W Arch
- Sure, 1941 46 494 593
  15 FANTA, I Lindokrinokori 937 9 34 38
  16 FAURT D B and MUDGETT C S
- 915 AURI 19 19 and the best of the second of
- 20. C XXIT LASL. Med. Rec. 030, 15 1 3 25 2 GUROTTI C Arch. radiol 1030, 5 34 36 22 Histream F /sch mid. nat., Lorach 1030,
- 40 #7 274. 23. H Figure H Zisi Chi 040, 67 7 5 17 7 24. HOLMUK, EMILE WOOD, D V and STOCKTON A. B.
- Arch. Surg. 043, 47 65 77
  25 Hordy, I J. Arch. Surg. 02 2 52 534
  20 Heyr V C and Boy street, H T S. Arch. Surg.
- 034, 15 4 5 439-JACOBSON, A. S. Arch Path 1040, 30 005-0 JOROE, J. M. and LATTEN A, R. I. Arch Soc. egent.
- anat 1042, 4 5 30. 20 KATSURADA, Quoted by Poppa, A.(50) 30 KREMER O Arch. méd. expér anat. path
- 5 505-602. Kriro, E. G. Ann. Surg. 04 1 Lampuri Mario Arch, ital chi 1 3 364 370
- 937 47 43 432
- 33 Lerental Annual Mills, India Cit. 937 47 43 437
  33 Lerental Annual By Poppe, A. (50)
  34 Lerent C Ann. Fac med, Si. Paulo 1930, 5 91-9435 Medita Ocoted by Poppel A. (50)
  5 Malloret I B. J. Lep M. 900, 5 5 20.

- 37 Idem. Pathological Technique a Practical Manual for Workers I Pathological Histology Including Directions for the Performanc of A topoles and Microphotography Pp 76 208. Philadelphia
  II B Saunders Co. 1938.
- 18. MARINDOOT, GREGORIO. Zbl. alle, Path 1010, 74 01 200.
- 30 MARTIN J F and GLICHARD, \ ] med Lyon one.
- **30 500-6** 40. MINCHOTTEL R. I., and VIVAN Unquies, S. Arch
- rgent. enferm 194 6 478-453 41 Ideas Rev soed -quir pat, fem., 104 8 200-503. 42 Mrrr Myr Mem. Acad chi Par 037 63 662
- 507
- 43 Monteus, J. I. Brit. J. Sung. 104 29 30-53 44. Morchist Oboted by Poppi A.(50) 45. Natalet, L. M. and Cucra, J. P. Bol. Soc. ci
- Rounia, 030, 6 63 60. 40. Ozir E. L. Quoted by Poppil A.(40) 47 Picco, trousro, Arch ital anat, bitol cat., ost.
- 5 632-637
- 48. Idem Arch Ital, chi 930, 55 53 54 49. Piccaro, C. and Radiol med 940, 7 52 53. 50. Pores A. Arch Ital, mal. pp. dujer 1935, 4 534
- ROTON, MILENO, and AUBURTIN. Rev. med. fr. d'Ex-
- treme Orient 1041 9 130- 40. RUDO, T N and WALTON, JAMPS. But. I Surg.
  - 94 20 206-270. Sver I Med. Kli 55 Stuff I Med. Kll Berl 939, 35 384 385 54. Sween W M I Contributions to Medical Science
- by 11 rthin, LS (60)
- 58. UNIA Unquiz S. Rev da med. reent
- 56 400 40 50. Warring 1 S. Phys. Surg. 904, 25 337 35 60. Idem. Contributions to Medical Science. Ann Arbor Il urmiy 1 S. Phys. Surg
- George Wahr 917 Warrin, H. A., and Emrar E. S., Jr. Gastroen-
- terology 044 055 002 Witter B V Ja., and Billors, E. F V England J M 1037 17 307 313.

### SECONDARY SUTURE OF WAR WOUNDS

## A Study of Methods and Results in an Overseas General Hospital

KNOWLES B LAWRENCE, M D., F.A.C.S., and SOMERS H STURGIS M.D F.A.C.S.

Roston Magaschusetta

THE success of the U S Army Med real Corps policy of early débridement of wounds without primary suture in preventing serious infection was dem onstrated repeatedly during World War II It was equally well known that secondary heal ing of such débrided wounds by granulation and epithelization often consumed several months. Painful and disabling cicatrices osteomyelitis, stiff joints and muscle atrophy were frequent complications of wounds allowed to heal by second intention. Psychoneurosis developed or aggravated during long hospitali zation rendered many soldiers unfit for further combat duty For the first 2 years after Pearl Harbor the tremendous wastes in man power and in hospital care resulting from such a slow healing were serious hindrances to the war effort.

The obvious answer to these problems was to effect closure of débrided wounds as early as consistent with safety In World War I pri mary suture was practiced sometimes on selected wounds not more than 12 hours old (5) The percentage of successful healing in several series of primarily sutured wounds including a few joint wounds was excellent (from 66 to 04 per cent) but there was also a significant mor tality rate. It was concluded as a result of those experiences that the use of the primary suture after débridement should be restricted quiet periods in the fighting when the wounded patient could be kept in one hospital until healing was assured. The decision to close the rest depended largely on the reports from routine culture and smear taken at the daily dressing Delayed primary suturing of wounds free from hemolytic streptococci. within the first s days was distinguished from the secondary suture' of all later closures in which inversion of skin edges and a granula

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ting base had developed. In both delayed primary and secondary closures a miscella neous assortment of antiseptics had been previously applied to combat the nearly omni present infection. Reported results in small series of cases varied from 66 to 88 per cent of 'success. (r. 5). In general the methods of early closure of wounds during World War I seemed either too narrow in selection of cases or too cumbersome in practice to be applicable to large numbers of wounds encountered under average conditions of combat.

Experiences reported from the Republican army in the Spanish Civil War obscured the issue in a sense for, there emphasis was placed on the plaster encasement treatment of serious extremity wounds (7). The primary missions of reducing fatality rates and obtaining rea sonable healing of fractures despite unfavor able tactical attuations were accomplished by this treatment. That better and more rapid healing might be obtained by early closures of such wounds in communication zone hospitals and with the help of modern chemotherapeutic agents was not envisaged at that time

The use of chemotherapy in conjunction with radical débridement in World War II seemed to change the pathology of war wounds The majority remained grossly as clean as any other surgical wounds, if infection was not introduced by changing the dressing at least for a week or 10 days following debridement In overseas base hospitals surgeons guided by this finding tried secondarily suturing these wounds during this initial period when they were 'clean' By 1944 this procedure was being performed routinely during the first 10 days after débridement in many U.S. Army hospitals of the Mediterranean Theater 1 Re sults were gratifyingly good In June 1044 Kirtley and Trabue reported 92 7 per cent

Ses Circular letter No. 16, The Surgeon, North African Theater of Operations, United States Army April 19 1944. successful healing in one group of 217 de layed primary sutures, and only 3 infected wounds in another group of 30 cases studied in detail. In the latter group 71 individual wounds were sutured 4 to 5 days after wounding. Wilson obtained healing without infection in 85 per cent of 224 wounds secondarily satured when less than 10 days old. In wounds satured after 10 days the primary healing rate was reduced to 38 per cent. Wilson 5 study was based on 305 total wounds in 209 patients. The results in both series are colored somewhat by the fact that compound fracture cases apparently were not included.

The work of British surgeons on this important subject as reported to the Congress of Central Mediterranean Force Army Surgeons, Rome Italy February 1045 is of special in terest. After a somewhat longer period of participation in the war the British were fully aware of the advantages of early closure of wounds. Their efforts as described at that meeting were being directed toward the improvement of results in such wound handling chiefly by the local use of chemotherapeutic agents. Murray reported that or per cent of 500 flesh wounds treated locally with a penicillin powder at time of suture healed successfully after delayed primary suture! in contrast to 75 per cent successful healing in 220 proflavine treated wounds. In a paper entitled Early Closure of Compound Frac tures at the same congress Hendry reported 60 per cent of his cases with complete healing of the skin over major fractures of long bones within 6 weeks after delayed primary suture

Secondary closure was performed on the wounds of approximately 2200 patients at the 6th General Hospital situated near Rome, Italy during July August, and September of 1044. The present report is based chiefly on a series of 1110 of these patients with more than 2700 individual wounds. Most of the balance consisted of a number of patients operated upon during this period which could not be included solely because the press of work at times made it impossible to obtain and record the necessary data. At least 100 patients were evacuated to the rear to create bed space be fore healing results could be evaluated. Oute

Syncorymous with our term "accordary suture.

a few cases, in which wounds were limited to amputations or to wounds of the fingers, toes or face were excluded also because they represented a different sort of surgical problem. Aside from these specific omissions the series was unselected and included various types of soft tissue wounds as well as those associated with compound fractures. Thirty different surgeons operating on these patients used their own judgment in carrying out the details of the general pollcy

#### GENERAL POLICY

A great influx of recent casualties arriving from forward hospitals with wounds already debrided made necessary the adoption of mass production methods of surgical man agement. This consisted principally of a systematic performance of secondary auturing in the early clean period within a week or ro days after debridement.

Guided by our own previous experience and reports from other hospitals, it was the policy to leave the dressings unchanged until the patient s arrival in the operating room. How ever a few wounds required preoperative inspection because of unexplained fever pain excessive drainage or hemorrhage. In general this method represented a vast saving in time materials and discomfort to the patient over the daily dressing regimen of World War I Many patients received sulfadiazine by mouth, and this was often continued for several days after operation. The use of penicillin paren terally was not routine and was usually restricted to severe compound fractures wounds into joints, and growly infected wounds. Transfusions of blood and plasma, vitamins and other supportive treatment were used as indicated. Most surgeons preferred a time interval of at least 48 hours between admission and secondary suture to allow for rest and observation

In the group of cases here studied of per cent were admitted to this hospital in time to be scheduled for secondary closure before the tenth day following their débridement. Occa sionally secondary closure was contraindicated by the condition of the patient or his wound. It was soon noted that the clinical appearance of the wound on the fifth or sixth day after débridement suggested that this was the most favorable time for suturing

On first inspection of these wounds in the operating room we were surprised at the small percentage which seemed unsuitable for closure because of gross aigns of necrosis. In a series of over 300 wounds personally observed by the authors, this was less than 5 per cent, and testified to the excellent results from débridement and chemotherapy usually peni cillin at forward hospitals. Culturing of wounds for determination of bacterial flora was impractical as a routine procedure.1 Wounds containing thin purulent exudate, with, at times slight reddening of skin at margins and turnidity of tissues proved to be trouble makers. Such wounds were very ant to become septic and break down if su tured in that condition and did much better after preliminary treatment for 24 hours or more with wet dressings of which the most effective seemed to be penicillin solution (500 or 1000 units to 1 c.c.) Patches of fibrin adherent to otherwise fairly dry and innocent looking wounds usually did not deter healing A number of wounds, though clean were of such a large size or so located that they could not be closed completely by secondary suturing. In some the unsutured part was left to heal spontaneously In others this area was covered with a split thickness skin graft immediately or at a later date. The longest wound measured 70 centimeters extending from the lateral aspect of the hip to the knee. It healed satisfactorily after secondary su turing. The greatest number of wounds in one patient was one hundred

#### TECHNICAL ASPECTS OF SECONDARY SUTURING

Anethesia Intravenous sodium pentothal was the most commonly used anesthetic agent. There were no deaths attributable to pentothal in this series. Novocain locally was used in about one quarter of the cases. Infiltration of subcutaneous tissue from the wound surface seemed simpler and caused less discomfort to the patient than block anesthesia through the intact skin

The wiscens of this decision to oralt routine wound cultures was confirmed later by the work of bently and Thomson who found that only ap per cent of series of a greaty clear wounds contained or thought bectral and that satisfactory beating was obtained after secondary suturing in 5 per cent of wran these "latested wounds."

Surgical technique Accurate approxima tion of the entire depth of the wound without excessive tension was the primary objective of the operation. It was felt that the less cutting or surgical manipulation of any kind the less risk there would be of breaking through the natural defenses against infection that had been mobilized about the wound edges in the preceding days. Wounds more than a week old, however generally require freshening or freeing up of the margins to obtain apposition of the skin edges without inversion Wounds over large muscle bellies, as in the thigh, but tocks, or arm, often presented a problem in closure unique to war injuries. The swelling of injured muscles at times produces wide retraction of wound margins. Where there is no significant skin loss the degree of tension required to close these wounds accurately reflects the amount of edema to be reduced Therefore, marked tension in the closure of these particular wounds is not only tolerated but proportionately necessary to relieve lymphostasis and congestion and undermin ing the edges to avoid this tension in such wounds is undesirable. Where there was major. skin loss extensive undercutting was resorted to without hesitation in order to close the would. Advancement and rotation of contig uous akin flaps occasionally permitted closure of wounds in which even wide undermining did not accomplish this result. Due to expemence with flexion deformities and recurrent breakdown of scars which were situated ver tically over joints, particularly in the popliteal space we utilized these maneuvers to obtain more nearly transversely placed suture lines in such areas. Black alk was the most commonly used suture material, employed sometimes in conjunction with silkworm gut. The latter seemed to cause less tissue reaction and

cutting through when under tension The deep fascia was approximated as a separate layer in a few cases. Several instances of post operative wound infection were seen with extrusion of nonabsorbable sutures however, and therefore buried sutures were avoided as a general policy. If the edges of aponeurosis or fascia are included in the deep bites of vertical mattress sutures, solid healing will be obtained in most cases. Of the few postoperative mus-

successful healing in one group of 217 delayed primary sutures, and only 3 infected wounds in another group of 30 cases studied in detail. In the latter group 71 individual wounds were sutured 4 to 5 days after wound ing. Wilson obtained healing without infection in 85 per cent of 224 wounds secondarily sutured when less than 10 days old. In wounds sutured after 10 days the primary healing rate was reduced to 38 per cent. Wilson s study was based on 305 total wounds in 200 patients. The results in both series are colored some what by the fact that compound fracture cases apparently were not included.

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Secondary closure was performed on the wounds of approximately 2200 patients at the 6th General Hospital attuated near Rome, Italy during July August, and September of 1044. The present report is based chiefly on a series of 1110 of these patients with more than 2700 individual wounds. Most of the balance consisted of a number of patients operated upon during this period which could not be included solely because the press of work at times made it impossible to obtain and record times consistent were evacuated to the rear to create bed space be over a consistent of the press of the pressible of the press of work at times made it impossible to obtain and record from healing results could be evaluated. Out

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a few cases, in which wounds were limited to amputations or to wounds of the fingers toes, or face, were excluded also because they represented a different sort of surgical problem. Aside from these specific omissions the series was unselected and included various types of soft tissue wounds as well as those associated with compound fractures. Thirty different surgeons, operating on these patients, used their own judgment in carrying out the details of the general policy

#### GENERAL POLICY

A great influx of recent casualties arriving from forward hospitals with wounds already debrided made necessary the adoption of mass production methods of surgical man agement. This consisted principally of a systematic performance of secondary suturing in the early dean period within a week or

10 days after débridement. Guided by our own previous experience and reports from other hospitals it was the policy to leave the dressings unchanged until the patient a arrival in the operating room. How ever a few wounds required preoperative inspection because of unexplained fever pain excessive drainage or hemorrhage. In general this method represented a vast saving in time materials and discomfort to the patient over the daily dressing regimen of World War I Many patients received sulfadiazine by mouth, and this was often continued for several days after operation. The use of penicillin paren terally was not routine and was usually restricted to severe compound fractures, wounds into joints, and grossly infected wounds. Transfusions of blood and plasma vitamins and other supportive treatment were used as indicated. Most surgeons preferred a time interval of at least 48 hours between admission and secondary suture to allow for rest and observation.

In the group of cases here studled of per cent were admitted to this hospital in time to be scheduled for secondary closure before the tenth day following their débridement. Occasionally secondary closure was contraindicated by the condition of the patient or his wound. It was soon noted that the clinical appearance of the wound on the fifth or sixth day after débudement suggested that this was the most Surgical technique

favorable time for suturing

On first inspection of these wounds in the operating room we were surprised at the small percentage which seemed unsuitable for closure because of gross signs of necrosis In a series of over 300 wounds personally observed by the authors this was less than 5 per cent and testified to the excellent results from débudement and chemotherapy usually peni cillin at forward hospitals. Culturing of wounds for determination of bacterial flora was impractical as a routine procedure. Wounds containing thin purulent exudate with, at times slight reddening of skin at margins and turgidity of tissues proved to be trouble makers. Such wounds were very apt to become septic and break down if su tured in that condition and did much better after preliminary treatment for 24 hours or more with wet dressings of which the most effective seemed to be penicillin solution (500 adherent to otherwise fairly dry and innocent Patches of fibrin looking wounds usually did not deter healing A number of wounds though clean were of such a large size or so located that they could not be closed completely by secondary suturing In some the unsutured part was left to heal spontaneously In others this area was covered with a split thickness skin graft immediately or at a later date. The longest wound measured 70 centureters extending from the lateral aspect of the hip to the knee It healed satisfactorily after secondary su turing The greatest number of wounds in one patient was one hundred

# TECHNICAL ASPECTS OF SECONDARY SUTURING

Anesthesia Intravenous sodium pentothal was the most commonly used anesthetic agent. There were no deaths attributable to pentothal in this series. Novocaln locally was used in about one quarter of the cases. Infiltration of subcutaneous tissue from the wound sur face seemed simpler and caused less discomfort to the patient than block anesthesia through the intact skin general policy. If the edges of aponeurosis or

this attention of the first process of the state of the s

tion of the entire depth of the wound without excessive tension was the primary objective of the operation It was felt that the less cutting or surgical manipulation of any kind the less risk there would be of breaking through the natural defenses against infection that had been mobilized about the wound edges in the preceding days Wounds more than a week old however, generally require freshening or freeing up of the margins to obtain apposition of the skin edges without inversion Wounds over large muscle bellies as in the thigh but tooks or arm, often presented a problem in closure unique to war injuries. The swelling of injured muscles at times produces wide retraction of wound margins Where there is no significant skin loss the degree of tension required to close these wounds accurately reflects the amount of edema to be reduced Therefore marked tension in the closure of these particular wounds is not only tolerated but proportionately necessary to relieve lymphostasis and congestion and undermin ing the edges to avoid this tension in such wounds is undesirable Where there was major skin loss extensive undercutting was resorted to without hesitation in order to close the wound Advancement and rotation of contig uous akın flaps occasionally permitted closure of wounds in which even wide undermining did not accomplish this result. Due to expe rience with flexion deformities and recurrent breakdown of scars which were situated ver tically over joints particularly in the popliteal space we utilized these maneuvers to obtain more nearly transversely placed suture lines in such areas. Black silk was the most com monly used suture material employed some times in conjunction with silkworm gut The latter seemed to cause less tissue reaction and cutting through when under tension The deep fascia was approximated as a separate layer in a few cases Several instances of post operative wound infection were seen with extrusion of nonabsorbable sutures however, and therefore buried sutures were avoided as a

fascia are included in the deep bites of vertical mattress sutures solid healing will be obtained in most cases Of the few postoperative mus

cle hernias observed only an occasional one has been symptomatic.

At first many deep wounds were drained at the time of secondary suture because of poten tial dead space retained blood clot or border line infection. With more experience this was found rarely necessary except in cases of compound fractures of the larger bones. Depen dent stab wound drainage employing soft Penrose tubing was found preferable to draining through the suture line. The drains usually were removed within 1 to 4 days.

The wound surfaces were dusted with sul fanilamide powder in some cases but only one of the surgeons felt this was sufficiently valu

able to employ it routinely

Casts or plaster solints were applied in many of the extremity wounds involving soft tissues only. After observing the breakdown of several of the unsplinted wounds near joints we were convinced that this should be practiced more widely

#### POSTOPERATIVE MANAGEMENT

It appears to be necessary to retain stitches in a secondarily sutured wound longer than is usually necessary in a primarily sutured wound. In the absence of infection the stitches were generally removed in from 10 to 14 days.

Mobilization of joints and muscle training were practiced as early as tissue reaction per mitted in many cases even before wounds were completely healed Experience showed that wounds of the lower extremities, however healed far more promptly if patients were kept off their feet until healing was complete.

#### RESULTS

Percentage of healing For purposes of detailed study the healing of these wounds was classified as primary delayed primary or secondary The meaning of primary heal ing is obvious. In certain wounds localized eversion of skin edges mild stitch reaction persistence of the drain sinus or delayed heal ing where cruciate incision corners had been brought together did not represent perfect primary healing. The end result though delayed a few days hardly differed from that in primary healing however. We called this delayed primary" healing Primary and

delayed primary healing together constituted satisfactory healing When definite infec tion and separation or breakdown of the suture line occurred the result was called unsatisfactors in so far as value of the operation of secondary suture was concerned 1

Calculated on the above basis the overall healing results in the series were as follows For 1110 cases the healing was either primary or delayed primary (and therefore satisfac tory ) in 037 or 84.4 per cent in 173 or 15 6 per cent the healing was unsatisfactory. In an unselected group of about half the cases (605 cases) the effect of an associated compound fracture was noted. Serious compound frac tures were present in 110 of these. There were incomplete or chip fractures in 20 other cases In 85 or 77 3 per cent of the 110 major frac tures, the secondary closures healed satisfac torily Although lower than the satisfactory" percentage for the total we feel this is an acceptable showing for the large and complicated wounds of this type. Twenty three of these involved humerus or femur 18 of the compound wounds healed satisfactorily" in this small group and only 5 were unsatis There were no cases of infection or gangrene leading to amputation attributable solely to the closure of the wound and no deaths. Secondary suturing of wounds complicated by compound fractures, then was found to be a sale and justifiable procedure.

Oblimum time for secondary suture Table I shows the ratio of satisfactory to unsatisfac tory healing after secondary suture by days from date of wounding. The ratio of virtually 10 1 for cases operated upon the 6th day after wounding is the best showing for any of the larger groups. After the 6th day the ratio becomes definitely less favorable. Since the delay in debridement of the wounds averaged nearly 24 hours, the choice of 5 days as the optimum time from débridement to secondary suture appears to be vindicated statistically in this series of cases.

Choice of anesthesia in secondary suture Local anesthesia was used in 243 cases with satisfactory healing in 215 or 884 per cent unsatisfactory in 28 or 11 6 per cent. General

Fig. all the tables in this report, the figures refer to came and not to individual seconds. Where there were malipie seconds, if only one brids down, the came was labelled. onestarfactory

anesthesia was used in 867 cases with satisfactory results in 722 or 83 3 per cent unsatis factory in 145 or 16 7 per cent Local novocain was used generally in the smaller wounds and only where there was no obvious sepsis. Keeping this method of selection in mind it is clear that in this series the use of infiltration anes thesia did not increase the postoperative rate of infection or adversely affect the percentage of satisfactory healing. We know of no in stance of significant wound infection attributable solely to the use of local anesthesia in the closure.

The figures for disposition Disposition after secondary suture in this hospital were available for 1204 patients as follows There was a salvage rate of approximately 72 per cent of the men for General Service within an average time of only 6 weeks after wounding The disposition of a great majority of the 18 1 per cent discharged for evacuation to the Zone of the Interior (United States) was determined by the presence of fractures nerve injuries amputations or other conditions not directly affecting the healing of their wounds A higher percentage of the Limited Service cases were so reclassified chiefly because of wound disability but other conditions or complications also dictated this disposition in many cases

#### OBSERVATIONS

We feel that the healing results obtained in this large series of war wounds can be improved with more experience. Limitations as well as possibilities of secondary suture have been learned. Some of the older or slightly infected wounds might have healed better after application of hot compresses or antiseptic dressings for a few days before suturing. The more experienced use of the various plastic surgical maneuvers to obtain approximation of skin edges without tension more thorough splin ting of wounds near joints, and enforced bed rest during healing of leg wounds all should increase the percentage of satisfactory results. As noted above (2) British Army surgeons found that the local application of penicillin to the wounds increased their ratio of successful healing after secondary suture. They did not have a comparable series of wound cases with systemic penicillin treatment but showed

TABLE I —HEALING RESULTS BY DAYS FROM
WOUNDING TO SECONDARY SUTURE—IIIO
CASES

				Ratio	
Interval in days	Total cases	Satisfactory	Uses the factory	Satisf	Us- satisf
3		rS			
4		\$0	11	8.0	\
5	74	ss .	9	8.0	
6	24.0	6	21	9.8	1
7	200	73	7	64	
1	163	13	3	4	1
•	70	58		7	T
10	37	P4	13		-
11	35	3	4	- 77	1
		8	4	4-5	
23	2.3		,	.6	
14	1	,	5	-4	
5 OF THEFE	13	18		1.0	

that wound infection sometimes developed despite intramuscular penicillin in usual doses. Further reports may clarify this subject

Secondary suturing may be applied in peace-time traumatic surgery The majority of such wounds whether due to vehicle and industrial accidents or injury by firearms explosives or other means will prove amen able to immediate primary suture after thorough débridement. In the light of present knowledge the administration of penicillin systemically would be indicated in all but minor wounds. A few wounds with excessive contamination marked tissue destruction or prolonged time lag between injury and treat ment will be more safely handled however by delayed suture. We would suggest cultur ing a wound of this type at the time of debridement Sulfanilamide or penicillin' could be applied topically if the surgeon desired and an occlusive dressing applied. The first change of this dressing should be made in the operating room on the fourth or fifth day If the wound appeared grossly clean and the first culture had grown no hemolytic streptococcus secondary suture would be indicated at that time. If however the wound appeared septic

\*Some British Army surgeons favor penkillin-salfathiansle powder for this use and frost the wound surface thoroughly

or the culture revealed hemolytic streptococcus suture should be deferred for at least 2 days. Wet dressings perhaps with peni cillin solution, should then be applied frequently until the wound becomes sufficiently clean to tolerate suturing Such a routine should result in satisfactory healing in a very high percentage of cases.

#### SIDIMARY

The results of secondary suturing of a series of wounds at an overseas General Hospital during World War II have been analyzed.

In 937 84.4 per cent, of 1110 cases, satisfactors healing was obtained as a result of this procedure

It was found to be safe and generally satisfactors to suture secondarily those wounds

associated with compound fractures. Details of technique and management related to secondary suture are discussed

It was possible to return 71 o per cent of the men to general service 100 per cent were reclassified to limited service and 18 1 per cent were discharged from this hospital for evacuation to the Zone of Interior

The application of this method of handling to certain peacetime wounds is recommended.

#### REFERENCES

1 Bulky L. Surgery of Modern Warfare, aded, vol. 1, chap. 18. Baltimore Williams & Williams Co., 1942.

chap, 18. Baltimore Williams & Williams Co., 1948.

Berrit P. Fill and Trocurous Scort Proc. Congr.

C. M. F. Army Surgroum (British). Rome Haly

February 18. W. Proc. Congr. C. M. F. Army Surgroum

(British). Rome, Italy Privary 18-19, 1945, Paper 18.

M. Haller, M. Proc. Congr. C. M. F. Army Surgroum

B. M. Haller, M. M. Dillay, 1941.

The Mrideal Department of the U. S. Army in the

World War. Vol. 1-Surgrey p. 896. Washington;

Government Printing Girc, 1947.

6. Mengary C. J. B. Proc. Congr. C. M. F. Army Surgroum

(British). Rome Haly Privary 18 19, 1945, Paper 4.

The North Paul B. Horbert Dec., 1940.

Witson, Halwartla, Ann. Sorry, 1945. 1, 139-156.

8. WILSON, HARWELL, Ann. Surg., 1945. 11 153-156.

# POSTCAVAL URETER, WITH DESCRIPTION OF A NEW OPERATION FOR ITS CORRECTION

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THE location of the right ureter behind the vena cava instead of over lying it, is a very rare anomaly, only 33 cases having been reported in medical literature to date. Even rarer is cor rective surgical treatment of the condition only a such attempts having been reported previous to the one presented here 1

In the present case a new operation was utilized which appears to have merit. It will

therefore be described in detail

#### REVIEW OF THE LITERATURE

Hochstetter, in 1802, was the first to describe a case of postcaval ureter in man this was in an infant a few weeks old and was discovered during routine dissection

Pick and Anson tabulated 28 cases up to 1940 including one of their own Five more have been added since one each by Harbach (1040) Harrill (1041) DeCarlo (1041) Gru enwald and Surks (1943) and Wilson and Herzlich (1944) The author's case makes the thirty fourth to be reported 2

Of these 34 cases 22 were diagnosed at post mortem examination or laboratory dissection 11 (including ours) at operation, and only 1

before operation

All but 3 of the 34 patients were adults. Of these 3 cases, all discovered at routine dissection, one was in a stillborn infant, another in an infant a few weeks old and the third in a year old child.

Twenty five were males 7 were females and in 2 cases the sex was not given. It has

From the Department of Urokey (James Bochanan Brady Foundation) of the New York Hospital.

The necessary funds for this windy were furnished by the Alfred Busiel Research Fund.

\*\*Commander Moody of the U.S.N. Horpital at St. Albana, N.Y. has notified the author of a sixth patient operated upon by him recently if its swerred the urrier and made an end-to-end anastomosis over the vena cava

assimonous ever the vens cave.

Since this articl was submitted, as additional case has been reported by Doctors L. F. Greene and W. M. Keurss of the Mayo. Clmic. This was the second cave in which the distroots was made before operation and the fifth case in which playle repair was done. The urreit was severed and annatomosed in its upper portion.

been suggested that the fact that males out number females by more than 3 to 1 in the reported cases may be accounted for by the greater number of male bodies that come to the dissection room and the postmortem table (where a majority of these cases were discovered) Of the II patients operated upon 7 were males and 4 females Although a small group, this would seem to bear out the belief that the anomaly is more common in males.

Postcaval ureter may take several forms. The most common form is unilateral per sistence of the posterior cardinal vein (observed on the right side only) the postrenal segment of this vein forming the postcava Most of the reported cases are of this type In 5 cases (Rotter Uebelhoer Adachi 2, and Harrill) there was double postrenal vena cava. one on the right and one on the left side the ureter passing behind the corresponding vein In only 1 case (Gladstone 1905) was there bilateral involvement. This case a stillborn acardiac infant, showed bilateral postcaval ureters (double postrenal vena cava, one on each side of the aorta with each preter passing behind its respective vein)

#### EMBRYOLOGICAL CONSIDERATIONS

Present day opinion unanimously ascribes the anomaly to the embryonic vascular system rather than the unnary Faulty development of the inferior vena cava and not maldevelopment of the ureter is the etiological factor responsible. In most of the reported cases the preureteric vena cava was associated with other anomalies of the retroperitoneal veins

All later attempts at explaining the origin of anomalous retroperatoneal veins are based on the embryological work of McClure and Butler (1925) and Gruenwald (1938) Ran dall and Campbell Pick and Anson and Gruenwald and Surks have gone thoroughly into the embryology of postcaval ureter and the reader is referred to their papers

Briefly in the development of the embryo three bilaterally symmetrical pairs of veins appear in the lumbar region the posterior cardinals (lateral) the subcardinals (ventral) and the supracardinals (dorsal) Numerous anastomoses between these form venous rings.

Quoting from Pick and Anson

"During fetal life the permanent kidney (meta nephros) having developed in the pelvis, ascends to the upper lumber level, passing through a ring of venous channels (perimetanephric or periureteral ring) The ventral limb of the ring is formed by the lumbar division of the postcardinal vein and the subcardino-postcardinal anastomosis (McClure and Butler and sacrocardinal vein according to Green wald) The dorsal limb is a derivative of the lumbar division of the supracardinal vein and the subcar dino-supracardinal anastomosis (McClure and But ler or sacrocardinal vein of Greenwald)

"Normally the postrenal portion of the inferior vena cava arises from the dorsal limb of the peri metanephric ring the ureter thereby being placed in an antecaval position. But, in the anomalous ar rangement of the areter and vessel, one of the fol lowing developmental alterations occurs (r) the ventral rather than the dorsal limb persists the preter then being postcaval (a) the dorsal limb fails to arise at all-with similar results (3) both limbs are present and persistent—the ureter passing be

tween cavae

Most writers on the genesis of this anomaly agree that it forms from that limb of the em bryonic perimetanephric ring which normally degenerates that is, according to McClure and Butler the cardinal vein. However two later writers (Gruenwald and Surks) after going very extensively into the embryology express the opinion that the preureteric vena cava is a derivative of the subcardinal rather than the cardinal vein.

### SYMPTOMATOLOGY

Symptoms, when present, are those of ureteral obstruction. The condition may be present throughout life bowever without

causing symptoms

Examination of most of the kidneys in adults showed hydroureter and in varying degrees, hydronephrosis and pyonephrosis. Stone formation was an occasional accompani

None of the 3 cases in infants showed of obstruction pres-

 Hydronephrosis may be: nder sure exerted by the vena ca

lying ureter, or by kinking or stricture due to the anomalous course of the duct. Uebelhoer states that in certain cases the constriction may be due to the right ovarian vein crossing the postcaval ureter

In our own case the symptomatology consisted of dull backache high up between the shoulder blades of 3 weeks duration accompanied by hematuris on two occasions severe headache at night and intermittent burning on unnation

#### DIAGNOSIS

In only 1 of the reported cases (Harrill s) was the diagnosis made preoperatively—a not extraordinary fact perhaps, when one considers the extreme ranty of the anomaly Cognizance on the part of the examiner that the condition may exist would appear to be a most important factor in preoperative diag nosis since the x ray findings are quite dis tinctive.

In Harrill a case the clinical picture was that of obstruction. Bilateral stereoscopic pyeloureterograms revealed a hydronephrotic right kidney with an elongated pelvis. From the preteropelvic junction the preter curved upward in a wide are toward the midline then downward toward the right side after which it continued downward in a normal course. As an important aid in diagnosis this author sug gests a complete series of stereoscopic roent genograms taken in the anterior posterior and oblique positions. He states "When viewed stereoscopically the radius of curva ture should be great enough to include a structure having the diameter and position of the vena cava

Another distinctive x ray finding that has been pointed out is the peculiar position that to the spinal column when the ureter Len In at roent lateral i, which of genograf found vens 4 courses i spine the ! tı t while away In t

bo yond the winding

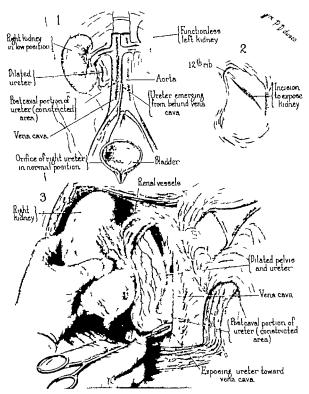


Fig 1 Condition before operation. Right kidney in low position ureter passes behind vena cave, and this portion of ureter is constricted. Left kidney is functionless. 2 Incision to expose right kidney and upper part of ureter 3 Kidney exposed Upper part of ureter and renal pelvis greatly dilated. Ureter being freed toward vena cave at point where it passes under the vein. Ureter constricted at this post (Indicated by dotted line)

shaped curve with the convexity directed supermedially The roentgenograms in our

the midline of the spinal column This patient had a left kidney shadow and a left ureteral case showed the right ureter to be very near orifice in the bladder but the ureter could not be catheterized nor was there any evidence of shadow casting material in this region in the intravenous urogram

In most of the reported cases in which operation was done the clinical picture was that of ureteral obstruction with the cause of the obstruction remaining obscure. It is our opinion that postcaval ureter should be considered in all cases of hydronephrosis of obscure citology, especially when the roentgenograms show a double right-angled kink with the ureter below this point displaced toward the middine.

### TREATMENT

Corrective surgery—namely transference of the ureter from its anomalous position behind the vena cava to a more nearly normal site—is the procedure of choice. In some cases however the kidney will be found so badly damaged that nephrectomy becomes necessary.

A review of the 11 cases in the literature in which operation was done discloses that ne-phrectomy was performed in 6 nephrolithot omy alone in 1 and corrective procedures in 4 (Kimbrough 1932 Ubelhoer 1936 May 1938 Harrill 1949) In all 4 cases the ureter was divided discussing from the retroperi toneal tissues drawn from behind the vena cava placed in normal position and anastomosed Harrills was the only case in which the division and anastomosis were above the ureteropelvic junction. The results in all 4 cases were reported as good

In our own case because it was deemed advisable to preserve the intrinsic nerve supply, the ureter was severed at its point of entry into the bladder wall removed from behind the vena cava and placed in normal position and its end reimplanted in the bladder wall as described below

The past history was unimportant. The right kidney could be left on palpation. Thurne showed 10 per cent pus and an occasional red blood cell, the prostatic secretion showed to per cent. pus otherwise the physical examination including

rectal examination was essentially negative A complete prological investigation was done Cystoscony revealed trabeculation in the region of the left ureteral orifice and considerable edema of the vesical orifice A lea I catheter to 6-I' pa sed to th Li lnes pelvis on the right side but a No 4 F cath eter could be passed only about a centimeters on the left side. The x ray films showed a small kidney shadow high in position, on the left side and a Lid ney shadow large in size and low in nos tion, on the right side. There was a large moth-eaten shadow opposite the transverse process of the third and fourth lumber vertebrae and another just opposite the fifth lumbar vertebra these were thought to be calcified Is mph glands. The right pyeloureterogram showed a greatly lilated kidney pel n and a right angled kink of the ureter None of the shadow casting material entered the left side. Excretory programs at c 10, and 25 minutes were made. These showed prompt function on the right ide and no evidence of function on the left The impression was that the patient had a dead

left kidner and a right hydronephrosis with a kink of the ureter

Two days after admission the right kidnes was exposed under spinal anesthesia

OPERATION

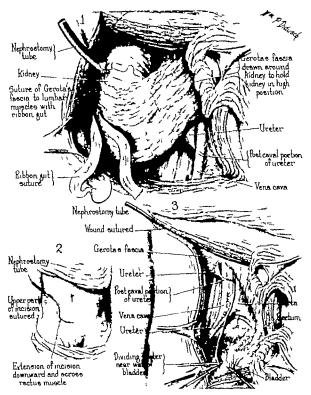


Fig. 3. 1. A nephrostomy tube has been placed in the kidney pelvas and fixed in position by ribbon gut. Nephropery is being carried out by drawing Gerota a fascia around the kidney and suturing it to the quadratus lumborum muscle with ribbon gut. 3, Upper portion of wound partity closed. Insign extended downward and across rectus muscle to expose middle and lower poetion of ureter. 3, Entire quere has been exposed. Dividing ureter close to its insertion in bladder.

The patient was then placed on his back and the lower end of the wound extended down the right border of the rectus muscle and

across its lower end to the midline. The in cision was deepened to but not into the peri toneum, which was bluntly dissected free and

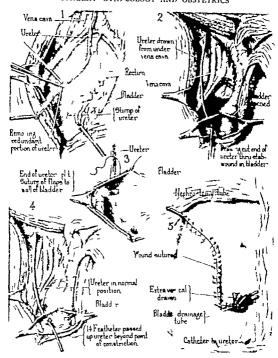


Fig. 3. Removing relundant position is directly a Uriter has been dea. I from under treas ears cut end being dea. through stats sound to bladder 4. Cut lend of urefer has been spike flags being a turred to bladder. No. 4.1 catheter passed up strete beyond point of construction. 3. Intuitie cound has been closed. A direct name day to the deal der and ta extravascal draims dow it the six of implication of the urreter. \( 4 \) Featheter from urreter above merging. (It her drains

the vena cava exposed. The ureter was identified to it under it, and passing down mesially across the left iliae vein just before it

joined the right flux to form the vena cava.

The entire lower end of the ureter was isolated and because it was thought advis-



Fig. 4. Pyelogram and pyeloureterogram after the injection of 25 cubic centimeters of skiodan.

able to preserve the intrinsic nerve supply of the ureter it was tied off at its insertion into the bladder wall. The ureter was then drawn from beneath the vena cava and brought over the vein the bladder was opened, and the ureter reimplanted into its superior posterior wall and fixed in position with a chromic cat gut No oo suture about 6 centimeters of the lower end of the ureter being excised to allow it to be straight, without tension

A No 14 F splinting soft rubber catheter was inserted into the ureter beyond its nar rowed point and brought out through the bladder incision and fixed to the skin of the lower end of the wound. A double suction tube was inserted into the bladder which was closed and the tube attached to the fascia in the lower angle of the wound. Four grams of sulfanilamide were distributed throughout the wound. A drain was inserted to the opening in the bladder and another drain to the anastromosis of the ureter and the bladder.

The wound was closed in layers and the patient returned to his room in good con dition

Postoperative course After the removal of the splinting catheter the nephrostomy wound continued to drain Attempts to insert a catheter by means of the cystoscope were un availing and 6 weeks after the first operation it was decided that the patient should again be operated upon

The bladder was exposed by a Pfannensteil incision extended upward on the right side It was opened and a No 10-F catheter was finally passed into the reimplanted ureter after incising the ureter about 3 centimeters above the bladder implantation at which point there was found to be a tight stricture The catheter was inserted into the Lidney pelvis and out through the urethra and fixed in position. The ureter was closed by a interrupted mattress sutures of No 2000 catgut The wound was closed in layers without a drainage tube in the bladder and the patient was returned to his room in good condition The No 10-F ureteral catheter thus passed from the Lidney pelvis through the bladder and the urethra

Subsequently a discharging sinus required still another operation at which time it was found that an abscess had developed about the lower end of the ureter and a considerable portion of the duct had sloughed off. The lower end of the ureter was, therefore implanted into the skin

The patient has made an uneventful re covery from this final operation The catheter

passes to a bag strapped to his leg and he goes about his work handling this apparatus vers well indeed

### 51 MM 121

1 Postcaval uniter is a very rare anomaly the present case being the thirty fourth to be reported in medical literature

2 This is an anomaly of the embryonic vascular system rather than the unnary being due to faulty development of the inferior vena cava. The productions vena cava is usu ally associated with other anomalies of the retroperatoreal vains

3. Of the 34 reported cases, 22 were dis covered at postmortem examination or laber atory dissection 11 (including ours) at opera tion and only a premeratively

4 I osteaval ureter may be present through out life without producing symptoms. Symptoms when present are those of ureteral obstruction which may be produced by pres sure exerted by the vena cava upon the under lying ureter or by kinking or stricture due to the anomalous course of the ureter

5 Stereo-copic roentgenogram taken in the antenor posterior and oblique positions aid in the diagnosis. The x ray appearances are distinctive in the following respects (1) In an oblique film the portion of the ureter dorsal to the vena cava will impinge against the lower lumbar spine whereas the normally situated uniter will fall away from it ( ) The postcavally placed uniter is always displaced toward to or even beyond the midline of the The ureter winding around the vessel forms a sickle-shaped curve with the convexity directed supermedially

6 Severe damage to the kidnes may re quire perhaectomy. Otherwise corrective surgery - namely tran ference of the ureter from behind the yena cava to its normal position in front of the vessel-is the treatment of choice

7 Only 4 cases treated by corrective sur gery have been reported previous to our own In 1 of these the ureter was divided and anastomo-ed in its upper portion in 1 the division and anastomosis were above the ureteropelvic lunction

8 The operation described here aims at the preservation of the ureter's intrinsic nerve supply while correcting the anomaly ureter is severed at its point of entry into the blackler wall removed from behind the vena cava placed in normal position and its end reimplanted into the bladder wall

### CONCLUSIONS

1 I ostcaval uniter should be considered in all cases of hydronephrosis of obscur, etiology particularly when the roentgenograms show a double right angled kink with the ureter be low this point di placed toward the midline

2 Divi ion of the ureter at its vesical end and reimplantation into the bladder wall is preferal le to divi ion and anastomosis higher up because (1) the peri taltic wave is not in terfered with and (2) stricture at the site of repair a less likely to occur

#### KELLRENCES

- Anacist, Il Anat Ana 1917 85 2 5 2 A 1999H, W. and Artis C. Urol, C. t. Key. 1939
- 41 740 3. Di Curio Jui J. L. d. Halt. 041 45 827 4 (E. Driose R. J. J. Smat. Physiol. 1905, 40 71 5 (C. 2. weild. J. Zech. mik. nat. Forsch. 1938
- CRI WALD P and Street, S N J Urol Balt

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## TOPICAL PENICILLIN TREATMENT OF ESTABLISHED INFECTION IN COMPOUND FRACTURE WOUNDS

JOSEPH WEINBERG M.D., F.A.C.S. Major M.C., A.U.S. Van Nuys California

EPORTS concerning the use of parenteral and local penicillin ther any in the treatment of established suppurative infections in compound fracture wounds have been generally pessimistic. The poor results with parenteral therapy are explained by the failure of all but a small proportion of the administered peni cillin to permeate the edematous indurated zone of tissue which forms a wall about the site of infection. The principal advantage of local therapy is the high concentration of penicillin which is maintained at the site of infection. The chief objection to this method has been the difficulty of instilling the peni cillin solution at frequent enough intervals and with sufficiently sterile technique to obtain the maximum benefits. The purpose of this report is to describe a method of topical penicillin therapy which overcomes these difficulties and which has proved itself to be highly effective in a group of cases which had been refractory to previous treatment by other methods

The cases in which this method was used were of compound fracture wounds in which established infection had existed for periods ranging from 21/2 to 27 months before starting the method to be described in which peni cilin telly a mixture of penicilin with lubri cating jelly is applied to the surface of the wound For the most part, the wounds were produced by shrapnel machine gun fire and rifle fire with resulting extensive destruction of soft tissue and bone. All of these cases had been refractory or had shown little progress with previous treatment, and have shown a greatly increased rate of healing with the change to topical application of penicillin In some instances this response has been spectacular healing taking place within a few weeks in wounds which were resistant to other methods of treatment for a period of months.

The average time between wounding and the start of penicillin jelly treatment in the 28 patients comprising this series was 10 34 months The average time between the initiation of penicillin ielly therapy and complete healing in 23 of the 28 patients was 1 16 months. There were two failures with the penicillin jelly treatment in the sense that the soft tissue wounds failed to heal completely Three patients remain unhealed at the time of this report but their progress indicates that healing will be complete within a reason able period without changing the type of therapy These wounds had existed for an average period of 16 months prior to peni cillin jelly treatment, and showed satisfactory progress but incomplete healing after an average period of 4 months of this therapy 1

### RATIONALE OF TOPICAL PENICILLIN THERAPA

The pathologic process at work in old compound fracture wounds is a vicious circle in which localized infection of bone usually goes on to sequestration. The infected bone and the sequestra act as local sources for further infection of bone and surrounding soft tissues which in turn causes further degeneration and sequestration. The cycle will continue as long as sequestra are present or supportation persists.

The aim of the penicillin treatment is to break up the vicous circle by eliminating or minimizing the infection in the wound while awaiting sequestration and to arrest infection after sequestra are eliminated. The penicillin mixture to be described when retained in surface contact with the suppurating area in sufficiently high concentration acts as a strong deterrent to infection and when used in conjunction with adequate drainage elimination of sequestra, asoptic technique and general supportive measures has proved to be

 $^{10}\mathrm{Discryation}$  of these patients—as interrupted by the transfer of the author to another hospital.



Fig. Case 3 a, Appearance of thea, June 0.44. A large fragment of devitalized bone was left in the because of the possibility of its regeneration. b, Appearance of the tilha August 0, 0.45. The degenerated fragment now shows definite ordicace of regeneration, with callus bridging the former gap between the fragment and the shaft of the tibia.

far more effective in promoting bealing than has any other method previously used by us in this type of disease

### TECHNIQUE OF TOPICAL APPLICATION OF PENICILLIN

A matture of pentallin and lubricating jelly in the proportion of 1000 units per cubic centimeter is applied directly to the wound at each dressing the standard United States Army lubricating jelly containing phenylmercuric acetate 15000 glycerite of traga canth quince seed and aromatics being used. This vehicle which is water soluble releases penticillin more readily than would an ontment base and its consistency assures its contact with the wound for several days. The acidity of the lubricating felly which is in the vicinity of pH 4.4 apparently does not inhibit the action of the penicillin. The penimental proportion of leavest partial leads to the penicillin of the penicillin and the state of the penicillin in the penimental proportion of leavest partial leads to the penicillin and the state of the penicillin in the penicillin of the penicillin in the penicillin in the penimental penime

used alone in some of the earlier treatments and the results were less saturfactory. Lubricating jelly is in itself a bacteriostatic agent and probably enhances the value of penicillin. An opportunity to compare the effects of penicillin jelly and lubricating jelly without penicillin was afforded in a patient

cillin jelly is prepared by mixing i cubic centimeter of normal salme solution containing 20 000 units of penicillin with 19 cubic centimeters of autoclaved lubricating jelly as a sterile medicine glass. This mixture is prepared just before beginning the wound dressings and is usually sufficient for 6 to 8 dressings. The wound is cleaned with hydrogen peroxide followed by normal saline solution, immediately preceding the application of the penicillin jelly. Hydrogen peroxide appears to be a valuable adjunct in the treatment and there is no evidence that it lessens the effectiveness of the penicillin when it is used in this manner. Normal saline solution was sixed allowed across of the expellit when the used in

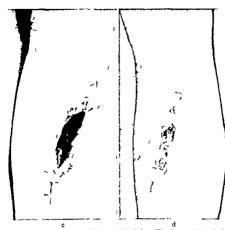


Fig. 1. c, Filling of wound defect by blood clot. The clot was injected with penicillin solution and was overlaid with penicillin july to prevent infection and thus encourage organization. d, Finel wound healing following split thickness kith graiting of the surface of the organized blood clot.

with wounds on the medial and lateral aspects of the leg Penicilin jelly was used on the severe medial wound and the standard lubricating jelly was used on the relatively minor lateral wound. After 2 weeks of treat ment the medial wound was completely healed while the lateral wound showed only moderate improvement. This and other observations offered convincing evidence that the beneficial effects of penicillin jelly are not due to lubricating jelly alone.

Dressings were made at intervals varying from daily to every fifth day during the experimental phase. In most instances there was evidence of bacterial growth if the dressing interval extended beyond the third day. The most favorable response was with dressings daily or every other day and since the wounds did just as well with dressings every other day that interval is now used routinely. The only exception is in the first few days of the treatment when suppuration is profuse. At that time it is well to apply the penicilium

mixture daily its efficacy being lessened by the mixture with pus. After several days often within 2 days the wound becomes so dry that the gauze dressing is found to be fixed firmly to the wound at each dressing. This adherence is due to the drying action of the lubricating jelly and to the lessened purulent secretion.

Strict surgical technique is observed in per forming the dressing. This is especially important in a large ward with a variety of septic wounds where cross-infection with organisms of high virulence is a constant danger. The dressers wear caps face masks and gowns the patient's mouth is away from the wound and the dressings are done in a private room whenever possible in order to avoid the dust of the ward. Casts are changed if they become soiled with exudate. Instrument technique is used throughout.

Treatment with penicillin jelly has distinct advantages over the method of instillation of penicillin solution through tubes The latter



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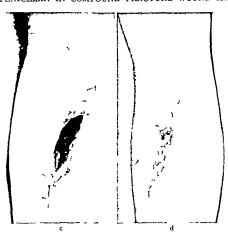


Fig. 1. c, Filling of wound defect by blood clot. The clot was injected with penicillin solution and was overlaid with penicillin jelly to prevent infection and thus encourage organization. d, Final wound healing following split thickness skin gratting of the surface of the organized blood clot.

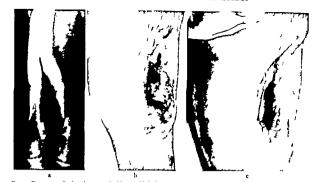
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 $\Gamma$ g 2. Case 30. a, Perforating wound of lower third of femur with dependion due to loss of soft tissue and bone. b, Appearance of soft tissue wound 20 months after wounding. Exposed bone 1 partially covered with suppurall g

granulation treare c. Treatment of the ound ith penicillin jelly for 27 days followed by split thickness skin grafting of exposed bose surface has resulted in complete healing

method was used in earlier cases, but was discontinued because of the difficulties en countered in administering the treatment. The chief objection was that the instillations were often made by unskilled personnel and it was unpossible to prevent micro-organisms from entering the wounds through the tubes due to errors in handling syringes and in managing the ends of the tubes. Three of ro wounds thus treated became contaminated with bacillus pyocy aneus within a period of 2 days. Another objection was the work en tailed in making the instillations at intervals of 3 hours in a large number of cases.

### BACTERIOLOGY

Bacteriological studies were made to determine the organisms present in the wounds and to determine the resistance of the infecting bactera to various concentrations of peni cultum. The finding of especial interest was the tendency of organisms which persisted in the wounds to show a progressively increasing resistance to the action of penicillin. This was particularly noticeable with Bacillus proteus. With the beginning of treatment several

wounds showed cultures of Bacillus proteus which were completely inhibited by concentrations of penicillin as low as 25 units per cubic centimeter. Cultures taken after 2 weeks showed Bacillus proteus from the same wounds to be completely resistant to concentrations of 1000 units per cubic centimeter For the most part Bacillus proteus was resistant from the beginning to concen trations of 250 units per cubic centimeter or higher This was also the case with Bacillus pyocyaneus Staphylococcus was susceptible to low concentrations of penicillin in most instances Twelve cultures showed complete inhibition with 25 units or less 1 was suscept ible to 100 units and 1 to 250 units There was little opportunity to check variations of susceptibility in this organism during penicillin therapy as the staphylococcus usually disappeared after a few days of treatment Organisms which showed complete resistance to concentrations of 1000 units of penicillin per cubic centimeter including Bacillus proteus and Bacillus pyocyaneus, did not prove to be troublesome contaminants, and usually disappeared from the wounds within a few

weeks. There has been an unusually high incidence of Bacillus proteus in this group of patients. This may be explained by the fact that a majority were previously treated with penicillin intramuscularly or with sulfona mides and the resistant proteus bacillus re mained in the wounds after other organisms had been made to disappear

Suppuration has been controlled in all of the wounds treated by this method regardless of types of bacteria present so it is not considered essential to make detailed bacteriological studies except for investigation purposes

### CLINICAL AND PATHOLOGICAL FEATURES OF WOUNDS TREATED

The 28 cases of compound fractures with long standing wound infection which comprise this series had been refractory or were slow in response to treatment by other methods before beginning the treatment with penicillin jelly Wounds of short duration and wounds which were near completion of healing when the penicillin jelly treatment was started are not included in this report. The injuries treated involved the following bones

Tibia, or tibia and fibula
Tarsal and metatarsal bones
Femur including hip joint
Shoulder joint, involving head of humerus
Shaft of humerus
Sacrum, complicated by pelvic abacess

The local pathologic changes which were considered most significant in influencing the course of the disease were suppurative cellulitis, edema of varying degree localized degeneration and necrosis of bone with or without sequestration degeneration and ne crosis of the soft tissues and impairment of regional circulation due to direct injury edema thrombosis and trophic changes. In addition there are to be considered the variables of the injuring force and the depth and irregularity of the wounds. As stated previously the types of bacteria did not appear appreciably to influence the course of the healing

### INFLUENCE OF BONE SEQUESTRATION ON

The course of wound healing was influenced as much by the proper removal of sequestra as



Fig. 3. Case 21 a, left, Appearance of femur 7 months after refracture. An intractable draining wound persisted throughout this period and was thought to be responsible for lack of tendency to union. b Secondary closure following 31 days of penicilian jelly treatment resulted in permanent bealing of the soft thisse wound and union of the fractured femur

by any other factor Removal of large sequestrated fragments was delayed as long as there appeared to remain a possibility of revascularization. This has caused a delay in healing in some cases because of the eventual complete necrosis of the fragment but the value of the segment if it did revascularize more than compensated for the delay in healing time. The following case illustrates this point

Case 22 Revascularization of devitalized bone segment (Fig. 1)

Patient, aged 30 years, was wounded in combat by shrapnel early in February 1944 sustaining a severe



Fig. 4. Case 3% a, left, Perforating fracture of sacram with builet lodged in pelvis. Multiple operations for drainage over period of 3 months, and removal of the builet were unsaccessful in resting suppursalive infection i pelva b, I jection of smus tract, originating in the pelvia and emerging over the left greater trochaster

with contrast sections also the principal pocket in the left liker region within the perist. The abscess, which had persisted for so months, because healed after 4 days of treatment with periodizin jelly indeed in the tract every other day. Observation for 6 months following healing also an evidence of recurrence of infection.

compound comminated fracture of the middle third of the tibis. Early treatment included débridement sulfadiazine orally and closed cast which was continued until June 12 1041, at which time it was decided not to remove a large deviablated segment of cortical bone because of the certainty of weakening the tibis by its removal

The would was then treated for several months with various topical medications including sulfathla zole outtiment anothloramide solution and aquirous solution of penicillin in the strength of roco unit per cubic centimeter. The would remained indokent with luttle roentgeoological evidence of bone regeneration in the devitatized segment of tibas.

Penicillin jells treatment was instituted December 11 1944 following which there was prompt epithelization if the wound together with evidence of progressive regeneration in the devitalized bone and

union of the fracture.

Small spleuhes of sequestrated bone became de tached from the regenerating cortical fragment from time to time and operation was performed on March 14, 1945 for removal of devitalized bone from the surface of the fragment. The wound defect was allowed to fill with blood. It was not possible to close the soft tissues over the defect. The blood clot which formed was treated with injections of several drops of penicillin. In normal saline solution coo units per cubic centimeter on the first third and fifth days following operation. Intramuscular injections of penicillin, 20 coo units every 3 hours were given for a period of 15 days beginning 2 days before operation. The blood clot was covered with

penicillin jelly

The clot became organized in 3 weeks and was
then covered with split thickness skin grafts. Sur

face healing was complete on April 30 1945 Later x ray examinations showed satisfact ry union of the revascularized segment with the shaft of the tibia.

The importance of carefully planning the operation of sequestrectomy cannot be over emphasized The sequestrum should be accurately localized beforehand by roent genographic study with views in addition to the standard anteroposterior and lateral whenever necessary. The incision is planned to permit a direct approach to the necrosed bone with a minimum of disturbance to living bone and soft tissues. In some of our patients it was necessary to make the incision through normal skin away from the wound to ac complish this. In 2 instances in this series, wound healing was unnecessarily delayed because of failure to remove all of the sequestra present. In these cases the operative incisions were madequate for proper exposure of the diseased area.

All operations of sequestrectomy as well as other types of revision operations are preceded and followed by several days of intra muscular penicillin therapy

The particular advantage of topical treat ment with penicillin jelly in wounds harboring sequestra is that further necrosis of soft tissue and bone is held in check by the inhibiting effect of the penicillin on the infection thus breaking the vicious circle described previously

### PRESENCE OF DEGENERATED BONE

The difficulties of management of degenerated bone are much the same as with sequestra. Degenerated bone causes greater delay than does sequestrated bone because it is impossible in most instances to determine whether the degenerated bone will revascu larize or will go on to necrosis. Extensive loss of bone makes it necessary to conserve as much osseous tissue as possible therefore one must guard against sacrificing bone in which there remains any possibility of revasculariza tion The point is stressed that, although early healing is desirable, it is not so important that it should be attained through the sacrifice of valuable fragments

### EXCAVATED WOUNDS

Depressed wounds due to loss of bone substance especially those in which bone remains exposed, are definitely a cause of delayed healing. This is noteworthy in shoulder wounds with partial or complete loss of the head of the humerus in which the wound is held open by the surrounding bony promi nences Two such cases in which healing was making little progress with sulfathlazole ointment, azochloramide instillations and penicillin instillations used successively showed a remarkably rapid response to penicillin felly

CASE 25 Healing of shoulder defect

Patient aged 20 years was wounded in action on June 24 1944 sustaining a mortar shell injury with a severe compound fracture-dislocation of the head and neck of the left humerus, together with other

The wound was débrided and an Orr dressing in shoulder spice cast was applied. He was evacuated to the United States after several months arriving at this hospital September 5 1944 Removal of the cast several days after his arrival here revealed a deep cone shaped wound on the prominence of the shoulder measuring 5 centimeters in diameter and 6 centimeters in depth.

Closed cast treatment was continued until October 18 1044 after which time the wound was dressed through a fenestration with hydrogen per oxide cleansing and 5 per cent sulfathiazole oint ment. Healing progressed slowly and on November 16 the local therapy was changed to instillations of aqueous solution of penicillin 500 units per cubic centimeter through a small caliber soft rubber tube every a hours. Some improvement was noted with this change in treatment, but the method was cumbersome and there was evidence of wound contamination apparently due to faulty technique in mak ing the instillations.

Penicillin jelly treatment was started December 11 1944. Improvement was noticed within a few days and the wound which had remained almost stationary at 2 centimeters in diameter and 3 centimeters in depth for some weeks previous to the use

of penicillin jelly now healed rapidly and was com-pletely closed on January 30, 1945 Arthrodesis of the shoulder was performed on April 12 1045 with primary healing of the surgical

wound.

Healing by organization of blood clot was accomplished in 4 cases of tibial defect. Blood was permitted to fill the defect follow ing sequestrectomy and saucerization of the bone The resulting blood clot was injected with a few drops of a solution of 1000 units of penicillin per cubic centimeter of normal saline solution. The surface of the clot was protected by a dressing of penicillin felly Wounds treated in this manner showed gross evidence of organization of the blood clot 3 to 4 weeks after operation. In 2 instances, the organizing clot was overlaid with split thick ness akin grafts 4 weeks after operation None of the clots liquefied or became in fected, and there was only slight depression of the area on completion of healing. In the light of previous experience with organization of exposed blood clot it is reasonable to assume that penicillin played an important role in the healing in these cases (Fig. 1, c and

CASE 14 Healing by organization of blood clot. Patient, aged 27 years was injured by shrapnel in combat with the enemy October 26 1944 sus-taining a severe compound comminuted fracture of the upper portion of the left tible.

The wound was débrided within a few hours and was treated with sulfathiazole powder vaseline gause and a circular cast from the toes to the upper thigh.

The dressing was not removed until he reached this hospital January 8 1945 at which time there was evidence of moderate suppuration with frag mentation of the tibia.

Operation of sequestrectomy and ostectomy was performed January to at which time several long splinters of necrosed bone were removed. Culture of the wound revealed Bacillus proteus which on

trating was inhibited by aso units of penicilia per cubic centimeter. A large defect in the tibia and soft tissues so centimeters in length 35 centimeters in width and 5 centimeters in depth was allowed to fill in with blood clot. Several drops of penicilini in normal saline solution, 1000 units per cubic centimeter, were injected into the blood clot on the first and third postoperative days. The surface of the clot was overlaid with a thic costing of peniciliin jelly. The clot organized with moderate retraction, and was covered with split thickness skin grafts on February 7. All grafts were successful, and bealing of the wound was complete on March 1 1016.

### EXTENSIVE LOSS OF SOFT TISSUE WITH EXPOSURE OF BOVE

Exposed bone is a deterrent to wound heal ing because of its tendency to degeneration and necrosis as long as it remains uncovered even though infection is held in check. Therefore an effort is made to cover the exposed bone with soft tissue at the earliest favorable time. Good results have been obtained by placing split thickness skin grafts directly on bone after gross evidence of necrosis and infection has disappeared even though wound cultures remain positive. The skin-grafted surface is treated with compression dressings moistened every other day with normal saline solution containing 1000 units of penicillin per cubic centimeter and compression is main tained for a period of 8 to 10 days This procedure was used in 5 cases in which an infected open wound had been present for from 6 to 28 months. All except a healed completely. The single case of failure was a tibial compound fracture wound which had remained open with bone exposed for 20 months following metal plating. There was no gross evidence of bone necrosus or suppurative infection follow ing operation of skin grafting and it is probable that failure was due to inadequate circulation in the exposed bone

Cast 20. Skin graiting of exposed bone surface following treatment with penicillin jelly (Fig. 2)

Patient, aged 21 years, was injured by shrapnel in overseas combat April o 1913 receiving a perfor ating wound of the distal third of the femur with loss of the patella.

Treatment prior to his arrival at this hospital April 8 1944, consisted chiefly of blood translusions and plasma infusions penkellin intramuscularly closed cast treatment, and two operations f sequestrectomy Examination here disclosed a large open wound on the anterior of the lower third of the thin with an irregular periorating wound of the femor. The wound was treated with sulfathlazole ointment dressings until October 17 at which time the bone was saucerized to encourage overgrowth of soft tissue.

Topical penicilin in normal saline solution every a hours was started Aovember 6 1944. Cultures at this time showed the presence of nonhemolytic Staphylococcus albus and Hacillus protess. The profuse supportuse supportus supports supports of the start of the start

bone was negligible
Pendillin Felly treatment was started December
15 1041 and the supportation subsided completely
within 10 days. Split thickness skin grains were appilled over an area of exposed bone 5 centimeters in
length and 2 centimeters in width on January 11
1945. All of the grafts remained viable and the
wound was completely heated on January 23 1915

Secondary wound closure by suturing was usually not possible because of the loss of the loss of tissues. Only 2 cases in the series were suit tissues. Only 2 cases in the series were suit able for this procedure. One of these described in the following case history illustrates the favorable effect of the procedure on a fractured femur which had shown little tendency to unite before the wound was closed secondarily

Case at Secondary would closure by suturing

(Fig. 3)
Patient, aged 21 years, received a bullet wound
November 21, 1043 which caused a fracture of the
middle third of the left femur. He was treated in
traction, followed by hip spics cast until May 30,

He refractured the femur June 17 1944 while out of cast, and was admitted to this bospital I month later Examination here disclosed a comminuted simple fracture of the middle third. The extremity was put in traction. An abscess formed in the soft theres in the region of the fracture and this was drained August so 1944. Ills condition, which had been critical, improved rapidly following adequate drainage. However drainage continued unabated. A large femoral fragment showed evidence of ad vanced degeneration and showed little tendency to unite to the proximal and distal main fragments. The soft tissue wound was intractable to treatment with sulfathiasole cintment, and showed little response to instillations of asochloramide solution and penicillin solution used successively

Penicillin jelly treatment was started December 13 1914, and was continued until January 12 1934 that time the trough-shaped wound, measuring 15 centimeters in length and 5 centimeters in depth abowed no suppuration, and was epithelialized ex

cept in its depth Secondary closure of the wound was performed January 12 1945. The wound re mains completely healed after a period of 4 months and the femur above evidence of increase in callus formation with amparent union.

### INACCESSIBLE WOUNDS WITH SINUS TRACTS

There have been several cases of deep sinus tracts in which it was inadvisable to explore the depth of the wound by surgical operation These patients were examined roentgenolog ically following injection of a radiopaque medrum into the tracts through a soft rubber catheter after making certain that there was free exit for any substance injected Follow ing this examination to determine the extent of the pockets of infection penicillin jelly was injected into the sinus tracts every other day The ment of the use of penicillin jelly in these cases hes in the fact that it is apparently harmless when it is retained in the wound One of the patients treated in this manner a pelvic abscess secondary to a bullet wound through the sacrum is of especial interest.

CASE 28 Healing of inaccessible wound with

sinus tract (Fig 4)

WEINBERG

Patient aged 24 years received an accidental 45 caliber bullet wound on June 12, 1943 the bullet entering the left gluteal region, piercing the middle third of the sacrum tearing segments of small bowel and sigmoid, and lodging in the pelvis. The intestine was repaired 2 bours later.

A large subpuble abscess was drained June 25, 1943 and a left retroperitoneal abscess was drained

August 12 1043

Ä flexion deformity developed gradually in the left hip and the hip became ankylosed with destructive changes in the joint cartilage. The earlier distinge of the pelvic abscesses had resulted in a persistent sunus emerging in the left lower anterior abdominal wall. In November 1943 x ray of the tract, with solused oils as a contrast medium, abowed ramifica tions extending toward the crest of the left filtum, the hip joint, and the ischium.

A total of 20,300,000 units of penicillin was given intramuscularly from February to August, 1944 Cultures of hemolytic streptococcus from the tract

were reported during this period

Exploratory surgical inculon was made in the left hip region over the greater trochanter on March 22 1944. There was no pus found in the hip Joint. An abscess broke through the exploratory hip incision on April 5, 1944. A subsequent pelvic operation per formed July 26 1944 was unsuccessful in arresting the drainage from the suns in the left hip region

The patient was transferred to this hospital September 10, 1044. At that time all surface wounds

were closed except the sinus tract emerging at the left hip Wound culture showed nonhemolytic Staphylococcus albus, nonhemolytic streptococcus, and Badllus proteus. The bullet was removed from the pelvis November 30 1944. There was no change in the drainage of pus from the sinus tract of the hip following this surgical procedure. No pus was seen in the vicanity of the bullet at the time of its removal.

Yray examination following injection of the sinus tract with radiopaque medium showed essentially the same findings as those previously described with the exception that the abscess in the

lower left pelvis was more clearly defined

Injections of pencillin felly into the ansus tract were started January 16 1945. The injections were made every other day through a No 12 soft rubber catheter 2 cubic centimeters of the felly being in stilled with very moderate pressure. The tract be came completely closed on January 30 1945, for the first time since the development of the sinus on March 22 1944, and has now remained closed for a period of 6 months. The white blood cell count and temperature remain normal and the patient is completely well except for an almost complete ankylosis of the left hip point.

It is possible that removal of the bullet played a part in the healing in this case but the fact that no communication was demon strated between the bullet and the abscess at the time of operation and the fact that the purulent drainage which had continued for 6 weeks following operation ceased promptly after penicillin jelly instillations would argue for penicillin jelly being the major factor

### INFLUENCE OF GENERAL DISTURBANCES ON WOUND HEALING

General factors which should be given consideration are the state of body nutrition the character and volume of blood, protein sufficiency vitamin balance, and concurrent diseases. It is difficult or impossible to measure the degree of departure from normal with ord mary methods in most of these factors except when the departure from normal is extreme Nevertheless it must be accepted that such disturbances do exist in chronic suppurative infections and that they should be considered as factors in influencing healing.

Protein insufficiency is a constant accompaniment of prolonged severe suppuration and a high protein diet is important in helping to overcome this deficiency. This is especially important for the solder returned from a distant outpost where some essential foods are

lacking and certain types of malnutrition are prevalent. Edema of the tissues in and around the wounds is interpreted as serious protein deficiency if circulatory cause can be ruled out. It has not been considered necessary to meas ure the proteins of the blood or to determine the albumin-globulin relationship except in patients with pronounced edema.

Vitamins which are known to be of import ance in wound healing particularly vitamin. C have been found to be low in most of the cases in this series. The need for this vitamin and vitamin B complex in greater quantities in those suffering from suppurative disease or in those who are undergoing wound healing has been satisfactorily demonstrated by research workers. The diet is supplemented with liberal amounts of orange juice and in addition to this a supplement of vitamin C is given intramuscularly if the patient abows a low vitamin C blood level These include patients abowing less than 0.8 milligram per 100 cubic centimeters of blood

A continued low blood level that does not improve with transfusions and adequate diet is usually due to suppuration. In such cases attempt is made to control infection by removal of sequestra or improvement of drainage.

Optimum circulation in the injured part is maintained by proper elevation by application of warmth in cases of vascular injury and by bandaging and splinting in such a manner as to prevent unequal pressure with its consequent accumulation of venous blood in the region of the injury. In this connection the principles of supportive and compressive band aging used in the treatment of vancose ulcers applies equally well to established compound fracture wounds of the leg

Local and general physical conditioning of the patient is continued throughout the treat ment except during penods immediately fol lowing major operations of sequestrectomy drannage, or wound revision Exercises are directed toward the conditioning of muscles in the affected extremity and muscles in general. This phase of therapy is especially important in patients whose wounds require months for healing BUMMARY

1 A method of topical application of pencillin in lubricating jelly in the treatment of established infection in compound fracture wounds is described. It has the advantage of maintaining high concentrations of penicillin in the area of the wound without the use of cumbersome technique or apparatus.

2 Evidence is presented of the effectiveness of this preparation in permeating the barriers in the zone of infection. This is in contrast to parenteral administration in which relatively small amounts of penicillin reach the area of

suppuration

- 3 Twenty-eight compound fracture wounds with established infection have been treated by this method. They had been refractory or slow in response to accepted methods of ther apy for penods varying from z to z 7 months, and all except z have shown a highly satisfactory response to treatment with penicillin jelly
- 4. Delay in the healing of old infected compound fracture wounds is most frequently due to the presence of necrosed bone. The presence of devitalized bone sets up a vicious cardin turn causes further necrosis of bone. Peni cillin jelly has proved itself to be effective in breaking up the vicious circle by eliminating or minimizing infection even in the presence of necrosed bone, and by inhibiting the soft tissue and bone infection after the sequestra are removed.
- 5 Skin grafting secondary wound closure and healing by organization of blood dot have been successful in most instances in the patents in this series treated with penicillinjelly. From the author's experience and the experience of others, such procedures would seem to have been less successful without its use.
- 6 Topical penicillin therapy is to be considered as a part of a general plan of treat ment. Good surgical judgment proper surgical technique maintenance of an optimizer of the proper surgical technique maintenance of a proper state of nutrition are absolute essentials in the treatment.

# IS THE BIOPSY OF NEOPLASMS DANGEROUS?

## An Experimental Study

# MARK E. MAUN M D., and W F DUNNING Ph.D., Detroit, Michigan

LINICIANS are prone to avoid the incision or removal of neoplasms for fear that the diagnostic procedures may serve to dissemunate tumor cells but the reluctance to obtain a biopsy specimen for histologic study often delays adequate therapy and invalidates an accurate diagnosis. It is generally accepted as a truth-and there is some experimental evidence to support the belief-that the rupture of the capsule of a tumor or the destruction of adjacent tissue structures incurred in obtaining a biopsy spec imen may serve to open vascular and lym phatic channels to tumor cells Physicians therefore avoid manipulation of suspected tumors in order to prevent local extension or metastases. These concepts imply that the extent of neoplasms can be roughly judged by gross inspection and that tumor metastases are usually limited by the observed tissue

Clinical evidence supports the theory that any degree of trauma either accidental or sur gically intended may serve to disseminate a malignant tumor and in rare instances to alter the nature of a benign growth. Thus students are cautioned by their elders not to squeeze or unnecessarily disturb a tumor in deed at times only a single student of an eager class is favored with an opportunity to touch gingerly the restrained new growth medical novitiates learn to regard any new lump fearfully as though its mysterious walls might disintegrate if the tumor cells were disturbed This acquired fear of tumor dissemina tion is readily increased as the physician may unjustly attribute rapid and abundant em bolic phenomena to his operative intervention in a seemingly localized new growth.

If one should accept the aforementioned theses that a tumor growth is completely lo-

calized by its capsule, by adjacent tissue bar ners or by unyielding vascular channels then interruption of such defenses might lead to a sudden catastrophe with rapid invasion of local and distant parts However a critical study of surgical and postmortem specimens gives ample evidence that neoplasms are not restrained or unduly inhibited by their capsules or areas of marked desmoplasia since metastases may precede capsule formation and emboli may readily flow in lymphatic channels found in encircling tissue barriers There is also adequate evidence to suggest that tumor emboli may occur throughout the life of a tumor and that growth in distal parts depends on the adaptability of the invaded tissues to the repeated attacks of viable em boli. It would not be unreasonable therefore to think that inoculation of an organ with a large mass of tumor cells might well produce a viable metastatic focus while an embolus of only a few cells might succumb to tissue de fenses Hence a decrease in the bulk of a neoplasm available for metastases should serve to decrease the incidence of metastatic tumor growth The most likely danger therefore from cutting into a tumor would be the me chanical transfer of neoplastic cells to the operative incision follows careful operative procedures This accident seldom

If one examines the medical literature rela tive to the danger of biopsy procedures it is obvious that the experimental evidence is con tradictory and inconclusive. It is therefore not surprising that clinicians are in a quandary when confronted by a suspected malignancy The value and the dangers of biops; were stressed in the medical literature in 1917 (3) when it was proposed to submit biopsy speci mens to the Health Department of New York City In the heat of the controversy editornals and numerous articles written by clinicians vigorously condemned the practice of obtain ing such specimens. Well known surgeons of

From the Department of Pathology, W. 3 ne University College of Medicine, in co-operation with the Detroit Insultor of Cancer.

that day referred to a biopsy as a criminal act, since fincision into a breast tumor renders the prognosis grave or hopeless. The late Dr Ewing however was of the opinion that a clean surgical incision produced no untoward results and pointed out that the diagnosis was often impossible without histologic study Tyzzer in 1013 demonstrated that daily massage increased the number of metastases in experimentally produced tumors in animals. F C Wood in 1919 injected rats with amall pieces of a carcinoma and after several weeks excised parts of the tumor in one group and the entire tumor in a second group Animals of a third group were used as controls. The animals were sacrificed in 3 to 4 weeks. The percentage of metastases in the third group that in which biopsy specimens were not obtained was 32 while in the first group the per centage of metastases was 22 In the group in which the tumors were completely excised the percentage was 21.8 In 1922 knox in the same laboratory inoculated mice with a transplantable tumor and massaged the resulting growths daily These inoculated ani mals and the animals of a control group were sacrificed 4 weeks following inoculation was apparent from this experiment that massage promoted metastases. Marsh working with spontaneous tumors in mice found that massaging these breast tumors increased the percentage of pulmonary metastases.

In a carefully controlled clinical study, Peterson and Nuttall selected two groups of squamous cell carennomas of which the size treatment, and course could be readily observed. From one group a buppsy specumen was removed with no attempt to control the degree of trauma. In the control group diag nosis was made upon clinical inspection. Both groups of tumors were treated in a similar manner and followed for a period of 2 years. At the end of this period the 166 cases in the two groups were reviewed and it was found that the incidence of metastases had not been

increased by the bloosy procedure.

After reviewing the avallable experimental evidence. Peyton was of the belief that the harmful effects of trauma had not been completely proved. He had the clinical impression that infiltration of a tumor with local anes-

thems could disseminate a neoplasm. He injected mice with various tumors. In one group the tumors were subsequently removed under general anesthesia while in another group local anesthesia was applied about the tumor. In the latter group in which metatases were usually infrequent, pulmonary nodules were abundant following the injection of the local anesthesia. He concluded that the use of local anesthesia for the removal of a neoplasm might be a dangerous procedure

Since present medical opinion and experimental evidence are not entirely in accord it seemed desirable to investigate the problem further employing more biologically uniform material. With the development of relatively homogenous inbred stocks of rats and mice and a diversity of carcinogenic agents, the experimenter has at his command a limitless array of transplantable tumors with 100 per cent predictability of progressive growth. By the transplantation of small fragments from an induced or apontaneous tumor into any organ or tusue of other hosts of like genetic constitution the experimenter may duplicate many thousands of times, if desired, the growth of the same neoplesm. The difference between these transplanted tumors and the same tumor in the primary host is that the causative agent is not operative in the sec ondary hosts. However such material is ideally adapted to the study of the effects of any procedure on tumor growth

### MATERIAL AND METHODS

The transplanted tumors used in the present experiment arose spontaneously or were induced in relatively homogenous inbred rats and were transplanted into hosts of the same inbred line. All were progressively growing neoplasms which had been propagated by transplantation from 6 to 150 generations previously.

For the first experiment IRS 4317 a very malignant Cystocrus-induced fibrosarcoms was selected. The history on transplantation of this tumor has been previously described by Dunning Curtis, and Bullock (1). The rats were inoculated on the right forefoot with 2 milligram grafts of a tumor from the 150th transplanted generation. Nine days after in-

TABLE I—THE AVERAGE SURVIVAL PERIOD AND TUMOR WEIGHT AND PERCENTAGE OF METASTASES OBSERVED IN OPERATED UPON AND UNOPERATED UPON RATS BEARING CONTROL CONTRO

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0.5 centimeter in diameter they were completely excised No attempt was made to remove a margin of healthy uninvolved tissue. The skin was secured with one or two inter ruptured sutures.

The tumor used in the second experiment was R 2426 a spontaneous papillary cystad enocarcinoma of the mammary gland study of the growth of this tumor on transplantation has been reported by Eisen. Frag ments weighing approximately 3 milligrams of a tumor from the 31st generation were in serted under the skin of the right side by means of a trochar This tumor grows rela tively slowly and the biopsy was not per formed until 60 days after inoculation when the tumors weighed approximately 5 grams An incision about 1 centimeter in length was made with a knife through the akin and a wedge shaped slice of tissue about 02 cents meter at the margin was removed. Since the tumors were somewhat cystic and hemor rhagic a considerable amount of bloody fluid and tissue exuded through the incision when experiments the capsule was cut. When the hemorrhage subsided the wound was cleansed and closed

Rats bearing transplanted adenocarcinoma of the 10th generation of R2572 were used for the third experiment. The primary tumor was a mixed tumor of the mammary gland The separation of the epithelial portion has re

cently been described by the authors (2) The tumors were unplanted similarly to R2426 and 22 days after transplantation when they weighed approximately 5 grams a simple bi opsy was performed. This tumor is fairly firm in consistence and only a small mass of tissue was removed and the wound closed with a suture.

For the fourth experiment rats bearing transplanted squamous cell carcinoma M-C osi were used The primary tumor was

induced by a 3 milligram pellet of methylcholanthrene in the prostate gland of an agouti Irish male rat of the 24th BxS genera tion of AxC line 9935 and has not been pre viously reported. Transplanted tumors of the 7th generation were used for this experiment and the biopsies were performed 20 days after implantation when the tumors weighed approximately 5 grams as in the two previous

Following the biopsy the tumors were al lowed to grow until death of the rat occurred. A careful postmortem examination of the bi opsied and control series included measurement and weight of the neoplasm and exammation of the superficial lymph nodes lungs and skeleton for metastases. The lungs were injected with 10 per cent formalin and pre served with a section of the tumor and the lymph nodes for microscopic examination

All preserved tissues were examined thor oughly The biopsied series were compared with the control series for the average number of days which they survived after transplantation and for the percentage with metastases.

### RESULTS

The results are summarized in Table I. In the first experiment 19 rats of the control series bearing fibrosarcomas survived an average of 28 days after inoculation. The tumor removed postmortem weighed an average of 21 grams 15 or 79 per cent, of the rate had lymph node metastases and 17 or 90 per cent, were found to have lung metastases. In the experimental series the 19 rats which had their tumors excised o days after inoculation sur vived an average of 42 days. The difference in average survival period of 14±3.8 days is statistically significant and represents the equivalent of nearly a year and a half in a man a life. The average weight of the tumors was 34 grams and larger than the tumors of the control series but the percentage of lung and lymph node metastases was not increased being respectively 84 and 63 per cent.

In the second experiment 19 rats of the control series bearing adenocarcinoma R 2426

survived an average of 98 days. The tumors weighed an average of 24 grams and only 5 or 26 per cent, had lung metastases. One, or 5 per cent, had axillary lymph node metastases. The 20 rats in the experimental series survived an average of 125 days. The average tumor weight was 15 grams. Three or 15 per cent, had axillary lymph node metastases and 12 or 60 per cent, had lung metastases. The difference in average survival period of 27 ± 8 s days in favor of the rats operated upon is also statistically significant and represents the equivalent of nearly 3 years in a man s life. The tumors were smaller than in the control series averaging only 15 grams. The differ ence in average weight of the tumors in this series was probably due to more extensive ulceration and the prolongation of average survival time was a result of the removal of a considerable mass of the tumor in the opera tive procedure. The significant increase in percentage of lung metastases was a result of the increased survival period Figure 1 shows the length of survival of each rat in the two series, with the individuals which showed microscopic and gross lung metastases desig nated by cross-hatched and blackened bars respectively. In the control series 3 rats in which lung metastases were discovered by microscopic examination survived 80 96 and 100 days. Three rats in which no lung involvement was detected survived 101 108 and 177 days and the 2 rats with extensive gross metastases survived for 164 and 165 days. Among the rats operated upon microscopic lung metastases were observed in 3 rats which survived respectively 80 80 and 95 days. Three rats died after 106 110 and 247 days respectively with no lung involvement and all but 2 which died after 106 and 117 days, respectively of those with gross lung metastases survived any of the control series which died without lung involvement.

In the third experiment 20 rats of the con-

trol series bearing  $\frac{R_{-2572}}{10 \text{ A}}$  survived an average

of 110 days after transplantation. The tu more weighed an average of 61 grams and only 3 or 20 per cent, had lung involvement. In the experimental series 18 rats with biopsied tumors survived an average of 113 days with tumors which averaged 39 grams and 4 or 22 per cent, had lung involvement. There were 2 additional rats in this series in which the tumors practically ulcerated out following the operation. These two hosts survived for 276 and 373 days respectively Both had large tumors at necropsy. One had lung and lymph node involvement and the record on the other was lost. In this experiment employing a tumor of firm consistence in which the blopsy specimen comprised only a small fraction of the mass of the growth, no prolongation of survival period was noted and no difference in the percentage of metastases was detected except in the 2 instances noted in which secondary infection following the oper ation inhibited the growth of the tumor

In the fourth experiment 34 rats of the control series bearing M-C 951 survived an

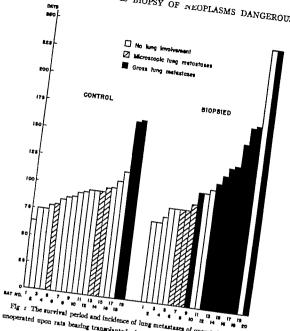


Fig. 1 The survival period and incidence of lung metastases of operated upon and unoperated upon rate bearing transplanted adenocarcinoma  $\frac{R}{2400}$ 

average of 93 days and the 20 rats of the ex perimental series in which the tumors were biopsied 20 days after inoculation survived an average of 95 days. Since these tumors char acteristically ulcerate early the tumor weight in both series was based on the combined weight of the superficial lymph node metastases. In the control series the lymph node metastases averaged 15 grams compared with 13 grams in the experimental series. In the control series 31 or 91 per cent, had lung metastases while 18 or 90 per cent, of the ex perimental series had lung involvement. Skel tal metastases were observed in 74 per cent

of the control series and in 75 per cent of the experimental series. In this experiment like the preceding one in which the biopsy speci men was not a factor in the mass of the growth no difference was detected in survival time or percentage in which lymph node lung or skeletal metastases were observed

### COMMENTS

The concept held by many clinicians that a biopsy may enhance the growth of a neoplasm has long needed further investigation. It is generally recognized that it is often impossible by inspection alone to distinguish benign from

malignant tumors hence it is usually necessary to obtain a blopsy specimen. If phy sicians were to avoid incising suspicious le sions to obtain a bropsy then the early diag nosis of cancer would obviously be impossible. Unfortunately it is difficult to evaluate the effect of traums on malignant tumors of man since the heterogeneous hereditary patterns of the hosts differ and the observed tumors seldom are identical in either their gross or their microscopic features.

In the observations recorded here in which homogeneous strains of inbred rats were in oculated with equal portions of the same transplanted tumors one could ascertain the effect of surgical trauma on the neoplasms. It is noteworthy from examination of Table I that if one removes a portion of a tumor he increases the length of life of the animal this increased survival is due presumably to the decrease in the quantity of cells available for growth. Such data confirm the recent clinical observations (10) that the surgical removal of all available tumor tessue in a seemingly hopeless case serves to prolong the individual s life for several years Further no untoward effects are recorded by cutting into the tumor mass or by severing lymphatic channels. A survey of these reports and a study of the data reported here would suggest that the treatment of a neoplasm is facilitated by the removal or destruction of any quantity of the growth and that the hosts survival is, thereby proportionately prolonged.

### BUMMARY

 Rate bearing transplanted fibrosarcome, adenocarcinoma, and squamous cell cancer were operated upon and compared with an unoperated upon control series for length of sur vival after transplantation and percentage in which metastases were detected.

2 The average survival period of rats bear ing transplanted fibrosarcomas was significantly prolonged by excession of the tumor o days after transplantation but the percentage of lung and lymph node metastases was not altered.

3 The average survival period of rats bear ing transplanted adenocarcinoma was significantly prolonged by the removal of a considerable mass of the tumor 60 days after in oculation The rats operated upon which survived the rats of the control series had a significantly higher percentage of lung met astases.

4. A simple biopsy performed on rats bear ing transplanted adenocarcinoma did not af fect the average survival period of the rats or increase the percentage with lymph node and lung metastases.

5 A simple biopsy of transplanted squam ous cell cancer did not affect the average sur vival period of the rats or increase the per centage of metastasis to the lymph nodes, lungs, and skeletons.

### REFERENCES

- DUNGSTRO W F CURTIS, M. R., and BULLOCK, F D Am. J Cancer 938, 3 90-1 3 2. Dunwing, W F Curita, M. R., and Mauw M. E.
- J Concer Res., 045 3 644-55
  3. Editorials Med. Rec., NY 917 9 156-376.
  4. Ericer M.J Am. J Cancer 1946, 39 56-44
  5. Krotz, L. C. Ann. Surg. 1991 75 89-441
  6. Marr, M. C. J Cancer Res., 927 110 07
  7 Permander R., and Nutralla, J A. Am. J Cancer
- 7 1995, 35 64-63.

  8 PETTON WILLIAM T Ann Surg 9,9, 11 453-452.

  7 TYLES, E. E. J Med. Res., 9 3, 8 399-333.

  70. Weitzell, A. O. Ann. Surg 94 1416-76 5.

  1 WOOD, F. C. J Am. M. Am., 90, 717 762-765.

# CHRONIC OSTEOMYELITIS COMPLICATING WAR COMPOUND FRACTURES

An Evaluation of 125 Patients Treated by Early Secondary Closure

THOMAS HORWITZ, M.D., F.A.C.S., Colonel M.C. A.U.S. Ventnor New Jersey and RICHARD G LAMBERT Captain, M.C. A.U.S., Hines, Illinois

THE remarkable success observed fol lowing delayed primary closure of war wounds on or after the fourth day following initial débridement and of late secondary closure following excision, either by direct suture or closure with skin flaps or grafts (Churchill) stimulated our efforts toward early closure of wounds in the treatment of chronic osteomyelitis complicating war compound fractures. We adopted a plan of conservative ostectomy followed by wound closure on the fifth postoperative day in cases in which such closure was mechani cally possible and appeared warranted and penicillin was used both systemically and locally

Observations, herein recorded and initiated September 15, 1944 have been directed toward answering the following questions

- I What is the value of penicillin systemically and locally, in war osteomyelitis?
- 2 What is the optimum time for ostectomy? 3 What shall be the extent of the ostectomy?
- 4. What is the value of early secondary wound closure not only in diminishing the immediate convalescent period with a mini mum amount of scarring and deformity but in preparing the field more adequately and more quickly for definitive reconstructive work, when such surgery will be necessary?

On our service we have accepted a minimum waiting period, following cessation of all drain age, of 3 months prior to definitive soft tissue reconstructive surgery and of 6 months prior to reconstructive bone surgery and we are convinced, following our own experience and that of others that shorter periods invite an

Presented before the Chicago Orthopedic Society at Vaughan General Hospital on April 13, 1645, and at the Surgical Conference of the Sixth Service Command in Chicago, Illinois, on July 27, 245.

increased incidence of recurrent infection. Despite our anxiety to reduce this time factor we do not accept the method of widespread extirpation of soft tissue and bone recently advocated in the treatment of war osteomyelitis, as the drive to eliminate infection surgically appears greatly to exaggerate the already existing soft tissue and osseous reconstructive problems (Kelley Rosati and Murray)

TECHNIQUE

Soft tissue is not sacrificed indiscriminately. The sinus tract and necrotic skin margins are excised and the ostectomy is limited to the removal of bone that is obviously dead and detached. Any bone that appears viable is spared. Sharp edges and prominences are not removed except when they might interfere with wound closure.

The skin is undermined freely In some cases this procedure has been carried to fully one-half of the circumference of the extremity However, there has been no spread of infection by such extensive dissection. It often permits complete skin closure or at least a considerable diminution in the size of the wound gap Mattress sutures of silkworm gut or wire are used in conjunction with buttons to prevent cutting in of the skin. The upper and lower portions of the wound are closed and the central portion is left open one or two sutures being placed in readiness for closure on the fifth postoperative day.

A vascline gauze or rubber drain is inserted into the depths of the central portion of the wound and plaster of Pans fixation is applied Usually the posterior one-half of the previous cast is utilized and completed with a few circular bandages. On the fifth postoperative day the drain is removed through a fenestrum and the sutures are closed if the appearance of

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7 PETERSON, R. sind NOTTALL, J. A. Am. J. Camer.

8. pr. 1936, 1940.

9. Tettes, E. H. H. Am. Surg.

10. R. Caret. A. D. J. Med. Res., 19. 5. 25. 197-195.

11. WOOD, F. C. J. Am. M. Res., 19. 14. 507-195.

12. M. Caret. A. O. Ann. M. Res., 19. 14. 507-195.

13. M. Caret. A. O. Ann. M. Am., 19. 14. 507-195.

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### TECHNIQUE

Soft tissue is not sacrificed indiscriminately. The sinus tract and necrotic skin margins are excised and the ostectomy is limited to the re moval of bone that is obviously dead and de tached. Any bone that appears viable is spared. Sharp edges and prominences are not removed except when they might interfere with wound closure.

The skin is undermined freely. In some cases this procedure has been carried to fully one-half of the circumference of the extremity. However there has been no spread of infection by such extensive dissection. It often permits complete skin closure or at least a considerable diminution in the size of the wound gap. Mattress sutures of silkworm gut or wire are used in conjunction with buttons to prevent cutting in of the skin. The upper and lower portions of the wound are closed and the central portion is left open one or two sutures being placed in readiness for closure on the fifth postoperative day.

A vaseline gauze or rubber dram is inserted into the depths of the central portion of the wound and plaster of Paris fixation is applied. Usually the posterior one-half of the previous cast is utilized and completed with a few circular bandages. On the fifth postoperative day the dram is removed through a fenestrum and the sutures are closed of the appearance of

TABLE I.—SERIES A. ANALYSIS OF 75 PATIENTS
TREATED WITH SYSTEMIC AND LOCAL PENI
CILLIN

	Completely her	iled wounds	
Postoperative	drainage	Involvement	
Duration	No patients	Bone	No.
to days	- 6	Tible	33
30 days	14	Tible, Shale	
6 weeks	<del>,</del>	Fibula	3
2 months	14	Femur	6
g months		Metatarad	
4 months	6	Magan.	5 4 5
5 months	5	Os calcis	5
	1	Astragalos	1
7 months	4	Cubold	1
		Radius	1
o months o months	II.	Hamerus	r
o monus	-1	Metacarpal	1
Total	73		
	Peralstent d	trainage	
7 5 months	3	Neck of femur and hip joint; reopera- tion 8-87 45	
8 months		Upper tible and knee probable reopers tion	
T tal	**		
*Lower famour a (Lower table and (De calcie, reop Both cassed dr	nd knoo joint dasklo joint seaton and bealing s alang to 3 months	te days luter e after resperation	

the wound warrants it. These sutures are removed on the tenth postoperative day and the cast is closed for 1 month. Subsequent external fixation will depend on the appearance of the wound and the progress of bony union.

Femur cases are returned to balanced suspension with skeletal or skin traction depending on the state of bony union.

In cases in which complete skin closure has not been possible or advisable, healing of the residual skin defect has been materially hastened by the early application to receptive surfaces of either split skin grafts or large pinch grafts

There have been some cases with extensive loss of soft tissue in which this method of delayed with approximation has not been applicable Here the extensive surfaces have been covered, even in the presence of considerable drainage, with intermediate skin or pinch grafts. In some of these cases, in which the defect has existed over bony prominences or easily traumatized areas or in the preparation of the field for definitive reconstructive measmers, more adequate skin coverage has been found necessary following this temporary skin dressing

Dose of penicillan Systemic. Penicillan has been employed intramuscularly in 15 000 to 30 000 unit doses every 3 hours beginning at 6:00 p.m. on the evening prior to surgery and has been continued postoperatively for a minimum of 10 days. Total dosage has varied from 1 200,000 units, in mild and moderately severe cases, to 2,400 000 units in the severe cases of esteomyelltis. More recently a uniform dosage of 40 000 units every 4 hours has been adopted (Keefer et al.) Our patients have invariably preferred periodic intra muscular injections to continuous administra tion by vein or muscle. The antibacterial agent was discontinued in 6 patients because of severe skin reactions, without mishap and there were 3 instances in which a clinical pic ture of nonspecific reaction was manifest toward or shortly following the completion of the course of penicillin-reactions attributed to impurities in the commercial preparations

Local Pentellin instilled in 20 cubic centi meter doses 3 times daily (250 units per c.c. of sterile water) was employed in the irst group of 75 cases, a 3 inch rubber tube having been introduced through a stab incision into the depths of the wound. This treatment was eliminated in the second group of 50 cases for purposes of comparison.

### EVALUATION OF CLINICAL MATERIAL

Series A consists of 75 cases of chronic osteomyelitis treated by ostectomy and delayed closure and the use of penicillin, both systemically and locally between September 15 1944 and March 1 1945 and evaluated up to September 15 1945 (Table I)

Of this group in 73 patients (97 2%) the wounds are completely headed while in only a cases (28%) are they still draining. It will be observed that in 41 cases (24.7%) healing was complete within a months and that wound healing occurred in another 31 cases following drainings periods up to 9 months a total of 72 healed without reoperation. One patient with involvement of the os calcis was reoperated upon following a 10 month postoperative draining period. Several well localized sequestra were removed the cavity waits col

TABLE II —SERIES B. ANALYSIS OF 50 PA TIENTS TREATED WITH SYSTEMIC BUT NO LOCAL PENICILLIN

Completely healed Postoperative drainage	wounds Involvement
Duration No. patients	Bone No
Dentage 140- beneura	
	Ibla 1.
	emur (
6 weeks 7	emur (great
s months 5	trochanter)
	lumerus (
4 3 110001111111111111111111111111111111	cum
	adles and ules
	adius :
	Droat :
	Tbula :
(	s calcis :
1	[ctatarsal
	Artus
	capula
<u></u> '	CALIFORN I
Total 45	
Persistent dra	
4 months 1	Thin, knee joint
	is calcis
2 months 1	
6 weeks 1 '	emur Ibla, knee joint

lapsed, and the wound healed 10 days later Of the 2 patients with persistent drainage fol lowing initial ostectomy one with a localized osteomyelitis of the femoral neck has been reoperated upon 7.5 months later while the other with extensive infection in upper end of tibla and knee joint draining 8 months after operation may require a second ostectomy 1

Total

Cases of ostcomyelitis at the ends of long bones with adjacent joint involvement have proved to be very recalcitrant. In one patient with chronic infection at the distal end of femur and involvement of the have joint healing occurred after 8 months of postoperative drain age in another with involvement of distal end of tibia and analie joint healing was complete o months postoperatively

Series B consists of 50 patients treated in like manner but without local penicillin. Ten patients were operated on between September 15, 1944, and October 15, 1944, and the remaining 40 between April 14, 1945, and July 6, 1945, all have been evaluated up to September 15, 1945 (Table II). In this series B, wounds are completely healed in 46 (92%) patients, and in only 4 (8%) are they still draining. It

TABLE III —ANALYSIS OF 73 PATIENTS WITH HEALED SOFT TISSUE WOUNDS (SERIES A)

Time required for wound healing after extectomy	Ne. pa- timats	Average peri preoperative age month		Large	N a-
days	6	6 s (4 to 1	) 6		
to so days	4	5 ( to 7	) 14		
6 weeks	7	47 ( 10 1)	7		
s months	4	3 4 ( to z	3 8		6
3 months	1	4 ( 5 to	6) 8	,	4
4 months	6	4 (3 10 6)	1	3	
5 months	1	4 (14 1	, .		
6 months	•	1			
7 months	4	4 (3 to 5)	4		
5 months	1	4	1	1	
o months	,	4	,	,	
1 months		1	,		

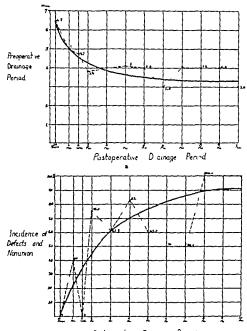
will be noted that in 45 cases (90%) healing was complete within 2 months after operation

No significant information has been obtained in an evaluation of the theaters of operations from which our patients have been derived. This observation also applies to the bacterial growths obtained from the wounds which revealed several types of penicillin sensitive staphylococci and/or streptococci, with a variety of other organisms which were often insensitive to penicillin. The latter groups did not appear to inhibit wound healing materially, although contributing to the amount and odor of drainage, and they tended to disappear as healing progressed.

### EVALUATION OF STUDY

I Value of penicillin A comparison of the progress of wound healing in those patients treated early in Series A in whom penicillin was first employed very cautiously and in total doses from 250 000 to 750 000 units, with those treated later with more adequate total doses (1 200 000 to 2,400 000 units) has convinced us that penicillin, systemically administered is of definite benefit in the treat ment of this type of chronic osteomyelitis Although our operative technique has not varied in these cases there are other variable factors present which make the evaluation of penicillin a purely relative one and not accurately measurable viz. the duration of pre-

Both cares crased draining to 3 months following respectation. I sthey words, healing has occurred in all 78 cases, or no to cont.



Postoperative Drainage Period

Fig. Analysis of 73 cases of chronic outcompelitis with healed soft tissus wounds (series Λ) a, Relation between preoperative and postoperative drainage periods. b, Relation between postoperative drainage period and large bone defects and/or mountion.

operative delay the severity and extent of the fracture and of the complicating infection and the anatomic site of the infectious process.

It is believed from a comparison of Series A and B that the local use of this agent has not served materially to alter the progress of wound healing and for this reason its local use has been discontinued. Thus the nursing problem required by repeated local instills tions is eliminated.

2 Optimum time for extectomy The value of adequate preoperative delay. Our patients have

often required whole blood for secondary anemia and a diet high lin protein and vitamin C Extensive drainage has been materially lessened during this waiting period by a preliminary course of penicillin. Elevation of the affected extremity has diminished edema and simple exposure of the wound has served to improve the condition of the soft tissues which are often macerated and inflamed from prolonged exposure to drainage. Adequate preoperative delay which has been tolerated well in all instances, not only encourages improvement in the patient's general condition but insures more accurate delimitation of the infection and permits progress of bony union

A study of the figures in Table III and of the graphs in Chart i demonstrates a striking relationship between the duration of the pre operative and the postoperative drainage periods and the incidence of large bone defects and/or disturbances of bony union

In an analysis of the 73 healed cases in Series A, most rapid postoperative wound healing (10 days) occurred in those with the longest preoperative delay (average months) This must, therefore be interpreted as the optimum waiting period in this series It will be observed that as the period of delay prior to ostectomy has lessened the period of postoperative drainage has lengthened and the incidence of bone defects and of nonunion has mounted In other words adequate preopera tive delay encourages a shortening of the post operative drainage period which means lessened soft tissue scarring. It also ensures more accurate delimitation of the bone infection which in turn permits easier definition and less sacrifice of bone by the surgeon at the time of ostectomy less residual bone defects and a greater likelihood for firmer bony union.

It may be argued that, for example a preoperative waiting period of 2 months with postoperative drainage for 4 months represents no greater loss than a 4 month waiting period with only 2 months of postoperative drainage. This is far from true for the case with the shorter postoperative period of drain age will show healing of soft tissues with less scarring will probably have had less bone sacrifice at the time of sequestrectomy and bony union will be more secure

2. Extent of ostectomy Conservative bone excision Only bone that is obviously dead and detached is sacrificed. Prominences and irregularities are not removed except when they may interfere with wound closure Protruding bone is excised to the level of the surrounding granulation tissue Bone thus spared may aid materially in diminishing the problems of bone defects and of delayed union The wisdom of this attitude is exemplified in an early group of patients in Series A in whom all apparently infected bone was resected boldly, with resultant bony gaps, shortening and deformity, and with prolonged drainage notwithstanding and who have been faced with extensive programs of reconstructive surgery. We dislike the term saucerization? in the surgery of these cases for the creation of a saucer like topography of necessity im plies the sacrifice of adjacent normal bone and the exaggeration of pre-existing defects

We have observed that extreme conservatism must be exercised particularly in the excision of bone in certain regions, as for example in the lower end of the femur, the upper end of the tibia and in the os calcis Indiscriminate resection because of the lack of adequate bone reformation in these particular areas serves to create considerable reconstructive problems prolongs convalescence and delays functional restoration. We have observed a number of these cases given sufficient time fill in spontaneously with scar, while the residual column of bone has been sufficiently sturdy to assume adequate functional responsibility. Thus far only a patients with upper tibial defects will require plastic reconstructive measures of any magnitude Collapse of the walls and elimination of the cavity appear worthwhile in selected instances of chronic osteomyclitis of the os calcis

A few areas of which the ilium and fibula are examples lend themselves very well to a liberal extirpation of involved bone since this sacrifice leads to no disability whatever yet often ensures successful delayed closure.

4 Value of delayed wound dosure. The extensive undermining of skin performed to permit a complete or partial closure following estection; has not resulted in the spread of infection in any instance. This procedure

offers a rapid method of closure with adequate skin, lessens the need for skin plastic measures ensures less scarring and a more satisfactory bed for reconstructive surgery of underlying muscle tendon nerve and bone

### CONCLUBIONS

- r Penicillin, administered systemically in adequate doses, as of value in the treatment of chronic osteomyelitis complicating war compound fractures. Its local use has not assisted materially in wound bealing and has been dis-
- 2 The purpose of early skin closure follow ing ostectomy in the treatment of war osteomyelitis is to encourage healing of these wounds with the least amount of scarring and deformity. This result is obtained most ideally when the skin flaps may be coaptated directly as herein described
- 3 Adequate preoperative delay ensures a more accurate delimitation of the infectious process. This serves to lessen the amount of bone that need be sacrificed at the time of ostectomy and allows for progression of union at the fracture site for if this is secured.

the treatment of the osteomyelitis becomes considerably simplified

4 These factors—the healing of soft tissues with the least scarring and deformity the sacrifice of the least amount of bone and the occurrence of union at the fractive site—all serve to lessen some of the more complicated problems in the reconstructive surgery of extremity war wounds.

It is our firm belief and our statistics bear this out that the conservative approach berin described assures greater likelihood for the satisfactory control of war cateomyelitis serik the least sacrifice of soft tissue and bone. Other methods in use elsewhere where the drive to eliminate infection carries with it the wide spread extirpation of soft tissue and bone, serve to esaggerate and complicate the reconstructive problems already present in these cases.

#### REFERENCES

CHURCHILL, E.D. Ann. S. 17, 1944, 130,269-35;
2. KEZFER C.S., HERWICK, F.P. VAN WINELL, W. and
PUTSAN, L.E. J. Ann. M. Ann., 1955, 185,167 164,
3. KRILEY R.P. ROMATI, L.M. and MUREAY R.A. Ann.
SUGE, 965 515

### PERSISTENCE OF THE VITELLINE (OMPHALOMESENTERIC) ARTERY AS A CLINICAL PROBLEM

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EVELOPMENTAL anomalies originat mg in the embryonic vitelline or omnhalomesenteric structures are pre dominantly those as occated with Meckel's diverticulum. Much less common than persistent elements of the vitelline ductal system are anomalies arising from the vitelline vascular system Despite their rarity persistent omphalomesenteric vascular remains were recognized and described in the latter part of the eighteenth cen tury That they may be of singular importance as a clinical problem is attested by the ensuing discussion EMBRYOLOGY

Review of the embryologic development and

consequently of persistent anomalies of the vitel line (omphalomesenteric) circulation begins with consideration of the yolk sac. In the human em bryo the volk and sometimes called the umbilical vesicle is demonstrable in the earliest known specimens i.e. at the end of the second week (11) Its nutritive function is probably of minor significance but its entodermal lining gives rise to the mucosal enthelium of the major part of the digestive tract while the mesodermal layer of its wall is the site of early development of blood cells and vascular channels (1 3) Primitive blood islands of the vascular anlage have been demonstrated in the mesodermal layer of the volk sac wall of the Peters and von Spee embryos (131/4 to 18 days of age, 12) As the yolk sac enlarges and as the prim itive gut develops the two structures become connected to one another by the so called volk stalk, or vitelline (omphalomesenteric) duct, which elongates as the embryonic body increases in size Subsequently the yolk sac atrophies and the vitelline duct becomes incorporated into the um bilical cord. It detaches itself from the gut during the sixth week of intrauterine life. Normally the duct degenerates after its detachment. However persistence of its intra-abdominal portion occurs in 2 to 3 per cent of cases, manifesting itself definitively as the familiar Meckel's diverticulum of the ileum.

Like the vitelline duct, existence of the vitelline circulation is transient. At the fifth week of in

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trauterine life the omphalomesenteric artery is the most prominent ventral branch of the aorta It arises from the latter by several roots and passing ventrally toward the umbilical cord di vides to surround the primitive gut by an arterial ring at the point of junction of the gut with the omphalomezenteric duct (Fig 1) In its subse quent course, it is paired so that two vitelline arteries are identifiable in the early embryo (s weeks) The paired vessels leave the embryo accompanied by the vitelline duct and are distributed as a ramifying plexus over the surface of the yolk sac. Coincidentally with atrophy and degeneration of the volk sac, one of the paired vitelline arteries disappears. The remaining one develops further and comes to lie in the mesentery of the midgut, supplying the latter with blood and becoming definitively the superior mesenteric artery (Fig 2) According to Cullen Its connec tion with the umbilical cord may persist long after the vitelline duct has disappeared, which nor mally occurs at approximately the sixth week of intrauterine life. Whatever may be the temporal relationship the vitelline artery normally loses its umbilical attachments to remain as the supe nor mesentenic artery

The vitelime veins arising in the wall of the yolk sac, are paired. The two vessels enter the abdominal cavity of the embryo at the umbilicus accompanied by the vitelline artery and duct From the umbilious the two venous trunks course cephalad, following the path of the gut to empty into the primitive heart. At the fifth week of embryonic development, the liver bud begins to expand and interrupts the vitelline veins in their course toward the heart. One of the vessels be comes incorporated for the most part in the growing hepatic sinusoidal system while the other atrophies and disappears. The surviving vessel receives the superior mesenteric vein and the splenic vein just before entering the liver and becomes finally the portal vein.

### CLINICAL SIGNIFICANCE

Persistence of the omphalomesenteric artery manifests itself anatomically as an adventitious intra-abdominal cord covered by peritoneum. Usually it is attached firmly at its two extremities

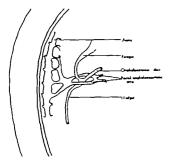


Fig. Origin of paired omphalomesenteric arteries from primit! sorts in the early embryo (5 weeks). Not relationship to junction of the omphalomesenteric duct and it testine.

one to the anterior abdominal wall at the umbilcus and the other to the mesentery of the terminal ideum. By such an arrangement there is formed a tense band traversing the abdominal cavity in an anteropostenor direction. Its potential danger as a source of intestinal obstruction is obvious. Per sistent viteline arterial remnants may be associated with a Meckel's diverticulum, in which instance a free band is formed connecting the diverticular mesentery to the unbillians or to the ileal mesenters to the unbillians or to the ileal mesenter; the resulting anatomic arrangement is a ring or loop through which coils of in testime may pass to become stranquisted. The least common form of persistent vitelline arter is that situation in which the vascular remnant is attached only at its mesentence end, the remainder of the vessel hanning free in the abdominal cavity.

Clinically it is significant that only 4 cases of persistent omphalomesenteric artery producing no symptoms have been reported. Of these only one was an adult, a dissecting room cadaver studied by Derbes and Hoge showing both per sistent artery and Meckel a diverticulum the case record contained no mention of abdominal ducomfort during lue. The others were infants examined at autopsy in 2 of whom the anomalous vessels were unattached at one end hanging harmlessly free in the abdomen (Meckel and Ruge) while the third was a newborn child found to have both meanters; and umbilies) attachments intect (Gesil) Inasmuch as 3 of the asymptomatic patients were infants at is striking that the liter ature provides only one adult patient showing no clinical disturbance as a result of persistence of the vitelline artery

Table I contains a summary of the literature of 12 cases of persistent vitelline artery in which disturbing clinical symptoms were present. Nine of the cases terminated fatally a mortality rate of 75 per cent. All but one of the deaths were due to acute intestinal obstruction. The retraining fa

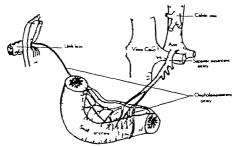


Fig. 2. Semidagrammatic representation of relationship of persistent couplishomeasurers artery t superior measurement error term. Normally the omphalomesenteric excel lower t umbifical trickment before term.

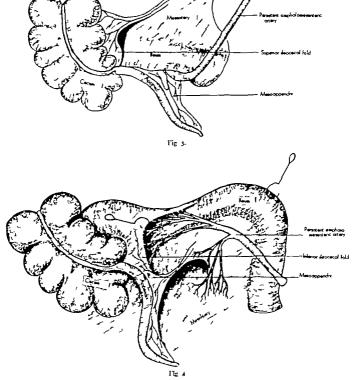


Fig. 3. The relationship of persistent omphalomesen teric artery to ileum and cecum as seen at the time of operation.

tality occurred in a child 4 months of age as a result of hemorrhage from a branch of the per sisting vitelline artery. This patient recorded by

Fig. 4. Heum retracted upward abowing terminal branches of persistent comphalomesenteric artery entering measurery

Fraser and McCartney presented a small area of granulation tissue in the umbilicus. Actual cauterization of the granulating surface was

examination were confirmatory of a diagnosis of acute intestinal obstruction. Exploration of the abdomen revealed a stout cord attached at the umbilicus and passing posteriorly to disappear in the retroperitorical tissues just below the third portion of the duodenum. In its course, the cord had encircled a segment of intestine causing com plete obstruction of the closed-loop type. The patient died on the fifth postoperative day Histologic studies confirmed the presence of venous elements in the adventitious band.

Roper Hospital No. 50778. A Negro laborar 35 years of some range and respect to the heapful June 20, 1925, complaining of abdominal pain of 6 months duration. He stated my to accentance your as a monthly marked. My mark that his pain was intermittent in character located in and that his pain was intermittent in character located in and around the amblicus and in the expantic middle between around the minimum and in the epigeants, minimum occurrent the riphoid and the navel. The pull was constrained by the appears and the marks. And pull was causationed to standing, with, straining, coupling, and remaining erect (or long periods of time. It was said to be completely coer in sea persons or time. At was man to be competently reclined by reclining. For this reason, the disconfinet was noticed rarely at alght. Near the end of a day's work, the notices revealed that the pain was at its word and that pounting occasionally occurred under such directioners. There was no radiation of the pain and it was not influenced There was no radiation of the pain and it was not innecessed by eather or hunger. There was no history of hundredness, bloody or tarry stood, Jamelice, constipation, or diarrhedness, the other body systems was accountinatory partially assumed as a supportant of the other body systems was accountinatory panels.

Physical examination revealed the following temper-Project crammature revenue; the resourcing temperature of both pressure, 140/75 pulse and respiration portrail. The patient was a well developed and will four manner, the process was a real accordance and were some since distress but obviously in pain. Abdomen as flat and moved with respiration. There was non-standard was not and noticed with a part of the control of the parabolic. Tendences was present on pressure upon the parable. Tenderness was present on presents upon the middless but was not excessive rebound pain was absent. On succeitable, peristable was audible and of normal character. Rettal cammination was negative. Remainder of middless and only involved the relief of the characters are absent only involved to relief.

Laboratory studies showed white blood cell count 9,300 ABDURATORY REDGES REPORT WHILE DESIGN CONTROL WHILE WHILE DESIGN CONTROL DESIGN TO FRANCE WHILE DESIGN TO THE PROPERTY OF THE with normal outercome training to the configuration of gratic con-Onnayes sowed normal article. Analysis of gastric contents showed normal fadings. X-ray of gastrointestinal tract after Ingestion of battom showed no abnormalities. tract after ingeneror or carriers amoved no accuse Blood Wassermann and Kime tests were negative.

A specific diagnosis was not made but in view of the A specific transposes was not make out in view or ter-peraturni nature of the patient discomfort and because he persurent nature or the patient discomport and because ow was incapacitated by his illness, inperciousy was done 3

was management by me more, aparomeny was over a days after admission.

Under again anesthesis, the patient's abdowen was metered through a night paramedian incision. A firm, excurrent natural a sign parameters measure in many and tremely test abrous cord, covered by personeum, was found attached at one extremity to the under surface of the modifices and at the other to the secretary of the terminal issum a commencer from the discretal function (Fig. 3).

The bend did not enter the issum of the issum. Discretion And the meanteric attachment revealed the terminal portion of the cord to fan out into numerous small, fibrous, filamenos me conq to ma our mon minerous seaso, ma ous, mannerous strands which lost themselves between the two leaves tors sometime when was transmission or twent use two nature of the memoratery (Fig. 4). The main cord looped over the flerm to the latter in such a way as to support in neum to the set of the terminal fleum and occum when the part can wegat to the beaming beam and cream when the patient was referred (F. 3). However, there was found to be no against along of the less sense to the covering of the no aggregatation or the mean serious to the covering or an adventitions hand so that there was no evidence of obstrucautrentision issue as that time was to expected a desirec-tion or compression of the intestine — Furthermore, the cord

was not adherent to any other viscers along its course to the was associated as any other, reaction among its course to use timbilities. Traction upon the anomalous structure at in omoracon. Alaction upon the anomatom sourcine at in leocreal extremity caused displane and inversion of the multiture as observed from without. Further explanation national as observed from minutes a most capacitative revealed no abnormalities of the abdominal viscent. Then was no Meckel's diverselym. The cord was camped and Harted at its two extremittee and excised in its critical agazen as its two extremines and extreme in its convey and the abdomen was closed in Layera

Follow-up examinations at 4 and 10 weeks after operation have found the patient to be entirely free of pain. He has nave round me papers to be entirely free or pa-returned to work and is considered to be cared.

Pathologic examination of the removed specimen, which Assumed a continuence of the control of the control of the continuence in length, revealed a lough cord measure y continuents to singui, revenue a cour core covered by periloneum. Microscopic study of the sections coverious permanenta, anaroscopae suscry or the actions, selected from various segments of the cord, demonstrated a centrally located, thick walled, patent artery surrounded term any accurations where a layer of more compact by a zone of loose fibrofatty tissue a layer of more compact of a control around these and an external overing of around the control around the control around the control overing of a control overing overing overing overing overing overing over a control overing overi (T.E. 5) Higher magnification of the central artery showed (18 s. 5) suggest magnifestation to the course marry married as well defined internal charic lamina and a patent lamina containing red blood cells, some of them in rouleur

The occurrence of abdominal pain in this pa tient was apparently on a mechanical basis. Review of Figures 3 and 4 explains the traction type of discomfort which was noticed only when the individual was standing erect. In this position the gravity effect was such that the full weight of the cecum and, most probably several loops of small intestine, in addition to the terminal ileum, was exerted upon the adventitious band. This in turn produced traction upon the peritoneal surface of the umbilicus. In the recumbent position tension of the cord was reduced materially and the umbilical traction eliminated. Vomiting which was said to occur at the peak of intensity of the pain was more likely of the reflex origin, due to traction upon the periumbilical parietal peritoneum, than to actual obstruction of the bowel.

Of interest is the fact that no symptoms refer able to the abdomen occurred until the patient was 35 years old. While difficult to explain, it is significant that the patients reported by Mahomed and by Buchanan and Wapahaw developed their first symptoms after 18 and 12 years respectively Postoloff's case was 36 years old before noticing abdominal discomfort. On the contrary Shaw's patient, who was 43 years of age had suffered from lower abdommal pain since childhood.

Intestinal obstruction is the most common (and most serious) complication of persustent omphalomesenteric vessels. That no evidence of fleus was found either at operation or in the patients history may be regarded as coincidental. In respect to the production of symptoms by vitelline vascular remains in the absence of mechanical obstruction, the case is similar to those reported by Shaw and by Gautier It is probable that intestinal obstruction would have supervened

SMITHY ET AL. eventually if the adventitious band had not been

- The embryologic development of the vitelline removed
  - vascular system is reviewed briefly 2 A review of the literature of persistent vitel
  - line vascular elements is presented in tabulated form and their clinical significance discussed 3. A case of persistent vitelline artery causing
    - disabiling symptoms which were relieved by opera tion is reported.
      - 1 Arex L. B Developmental Anatomy Philadelphia REFERENCES
      - 1 AREY L. B. Developmental Anatomy 1-misaceipulas W. B. Saunders Co., 1934.
        2 BOCIANA, J. S., and WAFRIAW H. Brit. J. Surg.,
      - 1939 40, 97 \$33 Umbilicus and its Diseases. Phila 1930-40. 27 No Umbilicus and its Diseases. Phila CULES, T. S. The Umbilicus and its Diseases. Phila delphis. W B Saunders Co. 1916. 4. DEEDES, V., and HOOZ, M. B. Anat. Rec., 1937 69 5.

- 5. Escriptori Arch Anat. Physics, wissen. Med., p. 222
- 5. LECTRICAY Arch. Anat. English, wisern. Aled., p. 228
  1834. Quoted by Fits (7)
  6. FALE. De Thee Directicults, Adjecta Mortal Historia
- 6. FALL. De Heo e Diverticulis, Adircta Morbi Historia
  P. 15, 1835. Quoted by Fitz (?)
  FITT, R. H. Am. J. Sc., 1884. 83 30
  FITT, R. H. Am. J. Sc., 1884. 83 30
  1020-21, 8 478.
  Q. GAUTTE, J. and SICCARTREY J. E. Brit. J. Surg.
  Q. GAUTTE, J. Ann. anat. 18th., 1031 8, 186.
  GEBU, A. J. Jach. Anat. Entw., 1938, 168 636.
  I. GEBU, A. J. J. Personal communication.
  I. Torona. H. E. Personal communication.

  - 11. JOHNAY, H. E. Personal communication.
  - II. JOZDAN, H. E. Personal communication.

    12. Krinzi, F. and Mall. F. P. Marual of Human
    Embryology Vol. 2. Philadelphia J. P. Lippincott
    Embryology Vol. 2. Philadelphia J. P. Lippincott
  - Embryology Vol. 2 Philadelphia J P Lippincott
    Co., 1012
    - Fits (7)
      16 POSTOLOFF, A.V Ann. Sure. 1946 123 315
      17 ROUS. C. Zachr Geburtsh. Grn., 1877 1 1
      17 ROUS. C. Museum Anatomicum, 1793 1 121
      18 SAMINTORT Museum Anatomicum, 1793

  - 18. SARITOTORY AUSSEUM ANATORICUM, 1793 1 121 Quoted by Fits (7 Cost. Gyn. Brit. Empire, 1925 32
    - 20. SPARODERBERG G Deut, Arch Physiol., 1819, 5 87

# A STUDY OF THE EFFECT OF PROPHYLACTIC ORAL SULFADIAZINE UPON INFECTION IN SOFT TISSUE

# WAR WOUNDS CLOSED SECONDARILY

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HE well controlled statistical studies of Meleney and his associates has cast serious doubt upon the efficacy of systems: suifonamides in preventing in fection in traumatic wounds. This present study on the other hand, although dealing with a somewhat different problem, indicates that sulfadiatine, given orally at secondary closure of soft tissue war wounds, reduces the incidence of infection and is associated with better healing.

The multiplicity of factors involved in wound healing makes the critical evaluation of any one factor difficult. It is difficult to carry out con trolled and impartial experiments in a laboratory the problems are greatly increased when one deals with patients rather than guines pigs and under war conditions it may at times appear impossible to obtain sufficiently accurate and detailed records, or observe the patient long enough to assess results. Furthermore, in the treatment of battle casualties the emphasis is upon producing the best immediate results by any and all means a relatively inocuous drug like sulfadiazine is likely to be freely used if it promises any concerv able benefit to the patient, rather than withheld in selected cases to help determine its true value.

In the treatment of the 200 soft tissue wounds which form the basis for this study it must be admitted at the outset that the aim was to procure the best possible results in each case, and not to conduct an experiment on the prophylactic value of sulfadiazine. The situation has been further complicated by the fact that in some instances penicillin as well as sulfadiazine has been em ployed prophylactically (Penicillin was not available for routine use in the light injuries which constituted most of the wounds.) Never theless, the very fact that wounds which promised difficulty were treated with prophylactic sulfadisting, lends weight to any differences which can be shown to favor the sulfadiazine treated group since it may be assumed that the bulk of the worst wounds will be included there.

From the Sargical Service of the Fifth General Hospital, APO 512, U. S. Army Read before the Society of University Surgeons, February 9, 945, New York, N. Y. It is perhaps worth mentioning at this point that little was expected from sulfadiante as a prophylactic when the series was begun in common with many other surgeons we regarded it with a skeptical eye. It was first med in those patients who had wound which promised trouble (as in deep wounds, or wounds which closed with considerable tension) or in whom good healing was of particular importance (as in wounds with associated damage of a peripheral nerve) Stock was taken after 150 wounds had been closed and the value of the drug appeared sufficiently established to warrant its routine use.

tablished to warrant its routher use.

It might seem from the difficulties detailed in the foregoing paragraphs that no valid coordu sions could possibly be drawn in this report. Some advantage may derive from the fact bow ever that the series is both consecutive and in every sense a personal one. The writer supervised the preparation of the wounds for closure, employed a uniform technique in operating upon them and personally observed their postoperative course. This at least eliminated the inevitable differences in judgment between ladividuals as to when a wound is ready to close, how it should be closed, and what constitutes a wound complication.

### MATERIAL AND METHODS

Material The series consists of 200 consecutive personally performed secondary closures upon soft tissue wounds in 131 soldiers 40 of the wounds were in 20 German prisoners of war 151 wounds were caused by high explosive fragments 47 wounds were caused by bullets, and a by nonbattle trauma. The wounds were all incurred in France and Germany between August, 1944, and April, 1945 In all but 7 wounds, preliminary debridement was carried out in forward bospitals and the potients transported to this general hospital anywhere from z to 25 days after the debridement. Compound fractures were excluded from the series, as were wounds in certain patients being promptly evacuated for other conditions (such as cerebral injury) which precluded a satisfactory period of observation. During this entire time it was the fixed policy of the surgical service

to close either by suture or graft all wounds at the earliest practicable time Recognized exceptions were wounds so small that they could be expected to heal spontaneously within 2 weeks, deep wounds with small openings wounds presenting severe and persistent infection (not more than 2 or 3 wounds were excluded for this last reason or a women were common for the was during the entire period). In general closure was preferred to grafting whenever it could be ef

Ninety three wounds represent a consecutive series for the entire hospital that is, every second ary closure performed in the hospital was carried out by the writer during this time, to prevent an artificial selection of easy cases for the sense. (Actually all wounds which promised difficulty in closure have been consistently turned over to the writer because of his interest in the problem.) The final results in the entire series are compar able to other published series of secondary closures Seventy-eight per cent of the wounds were solidly healed in 2 weeks or less.

Preparation of the mound. The appropriate time for closure was determined by the gross appearance of the wound. No closure was per formed at the first dressing but wounds which were clean when first seen were closed after a day or two of saline or azochloramide dressings. Wounds which were dirty or infected were treated with meticulous questings of 13000 sidicons solution of azochloramide once or twice daily at which time slough was picked off piecemeal. (In 3 or 4 cases a secondary debridement was necessary followed by secondary chastre a few days later ) Edema or induration at the wound edges was permitted to subside. Once the wound was grossly clean secondary closure was carried In some wounds appreciable delay in closure and even in the start of systematic preparation took place because of the press of more

Operative procedure. The procedure carried out depended entirely upon the physical character of urgent work the wound and fell roughly into one of three general types In those wounds supple enough to permit it (chiefly those received within 10 days of debridement) a simple closure was performed with widely speced deeply placed vertical mattress sutures of silk usually a heavy silk sutures were not buried Heavily scarred wounds were excised en bloc and closure carried out with buried sutures of fine silk or cotton and vertical mattress sutures of the same material to the skin There was an intermediate group in which there might he undermining of skin edges, or excision of exuberant granulation tissue, or modification of

Wounds having more than one complication have been wounds having more than one comparation have been listed here only once under the most serious. Any infection nates nere only oner uncer the most seriors. Any mection has been given priority over any technical complication Number Total

isto Las	peen given priority over	Hame.	90	
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the shape of the wound to facilitate closure, these have been grouped as ground revision. In this group buried sutures of fine silk or cotton might or might not be used. Catgut was not used in any or might here to used to cargot wound with marked wound. In an occasional wound with marked tension retention sutures over gauze pledgets were employed. In some of the wounds treated early in the series, sulfanilamide powder was lightly dusted into the wound this was discontinued later There were no instances of so-called

Chemotherapy The usual scheme for the empartial closure in this series. ployment of sulfadiszine as a prophylactic was to begin it as soon after the secondary closure as the patient could take it 4 grams was given as an initial dose and this was followed in an hour by a I gram dose after which he received I gram every 4 hours for 6 days. The penicillin dosage was 30 000 to 30,000 units intramuscularly every 3 hours for 2 to 5 days. Nine patients with 19 wounds were given sulfindiazine before as well as after closure, 2 patients with 3 wounds received penicillin as well as sulfaduarine before and after These are not treated as a separate group since an) advantage possibly resulting from the preclosure use of sulfadrazine is still a feature of its prophylactic value. There were only 2 instances of untoward reaction to sulfadiazine-both febrile-among the 92 patients who received the

Postoperative care In general, patients who had wounds of the lower extremity were kept in bed until healing was sound Splints were freely em ployed. Sutures were removed from the sixth to tenth day depending upon the appearance and

TABLE II -INCIDENCE OF INFECTION AND DELAYED HEALING (IS DAYS OR MORE) IN WOUNDS GROUPED BY FACTORS ACTING PRIOR TO SECONDARY CLOSURE

	1		lu/ection			Delayed beste	•
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All wounds excluding a technical fallence	197	5.3	29		43	1	-
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5 los or more	50	3	7	l			<u> </u>
Chemotherapy at time of injery Kone or openiumable	34	1	,,	3 es	,	34	Ke.
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days or more	206	10	35	} :	17	3	1
Proparation of wound at greated hospital days or ion	L ga			Yes	14	19	¥.
2 days or more	57	16	46	1		14	ī

<sup>\*</sup>Large wounds: these 6 can be more in length, or 3 can be more in width

location of the wound emphasis was placed upon supporting the suture line with adhesive strapping (which was often applied immediately after operation as well). Sulfadiazine was employed therapeutically, in 7 instances, and penkellin in 4 instances after infection had appeared in a wound. Their use in these cases has not been regarded as prophylactic although they may have contributed to the swifter healing of the wound. In 7 case particularly penfeillin appeared to abort a serious ceiluitis.

Appraisal of complications: This feature of the study is of paramount importance. Ideally, a single person, other than the surgeon, should follow all the wounds, since surgeons are some times reluctant to see blemishes in their own handwork. Unfortunately this ideal arrange ment could not be followed but the writer made an honest effort to be both strict and uniform in

applying critera of wound bealing and to note even the most minor compileations. Some evidence of strict interpretations is to be found in the fact that although 78 per cent of the wounds were healed in 2 weeks or less, 55 per cent are listed as having a compileation of one sort or another (Table I)

Complications were recognized as of two general types technical and infections. A hazr line may separate a "cutting sature from a mid attich abscens," or induration" (as seen a in a wound clored under tension) from 'moderate ceilulitis," although average examples in each group usually are clear enough. Wounds having both infection and a technical complication have been listed only once under the heading of infection. In each group of cases the wound was listed only under the most severe complication which it presented

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The total healing time from secondary closure was determ ined for each wound Here again there was necessariance of the second was not as latitude in interpretation but a wound was not regarded as healed until epithelization was com plete In all but 2 or 3 instances the patient was kept under observation a sufficient length of time to determine the primary fate of the wound. In these exceptions the patients were transferred out 7 to 10 days after secondary closure, but healing seemed to be progressing normally at that time. In 5 cases, it was possible to record the onset of a at 5 cases it was present to account after apparent late complication a week or more after apparent sound healing of the wound It is necessary to point out, however that in many cases the development of a late complication would not have come to our attention since the patient Wil promptly discharged to duty when thought fit and readmission would have been more than

likely at another hospital. This is an important but unavoidable limitation of the study

ANALYSIS OF DATA The following facts stimulated the present study 44 wounds received no chemotherapy at the time of closure infection developed in 21 or 48 per cent 107 wounds received oral sulfadiazine at the time of closure infection developed in 23 or 22 per cent. The difference is statistically significant(r) Rather than being a final con clusion this fact can only be the starting point of a detailed investigation since in a series this small it might well be a result of an artificial selection of wounds, or the unsuspected operation of other factors. For example the 107 wounds in which rulladnzine was employed might have been the smallest soonest treated and cleanest wounds of

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The 44 wounds in group A are the control of the con group. They are compared introducts with the form of another than the fifth and the fifth another than the fifth and the fifth another than the fifth and the fifth another than the fifth and the fi 10) wounds in group is and slao the 143 wounds or some of the most discult wounds of the Sively of the found in strong continues on the strong of t which being some some of group to some consumers that the consumers of the NOT NOW ASSETTING WORD STATE AS PROPERTY AND ASSETTING COMMANDS ASSETT as rejected in the last that there were it interests and it finishes of delayed healing in these 30 cm. I take the formal that it found wounds—a much higher incidence than is found in group B. It is therefore under to utilize group a constant to the group in the state of the s as group is an independent some uniar to value stoop markets in a markets in from anothers tan in-C as an inoepenoent group, but it is also mopossible to exclude it from consideration by possure to excuse it from consideration by running a dust comparison consideration by B and D its possible from between groups A and infections which developed despite suitable and the other hand either in the other hand either in their is

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TABLE VI.-INCIDENCE OF INFECTION AND DELAYED HEALING (15 DAYS OR MORE) IN BLE VL-INCLIDENCE UP INFECTION AND DELAYED HEALING (IS DAYS OR NORE) IN COUNTS GROUPED BY FACTORS ACTING PRIOR TO SECONDARY CLOSURE—GERMAN PRI

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\*Starge wounds: thom 6 cm. or more in langth, er 3 cm. or more in whith.

causes 2 from extreme tension and 1 from un obliterated dead space (not a hematoma) these three wounds have been also excluded from comparisons, since the failure was inevitable irrespective of a chemotherapeutic agent.

Tables II and III represent an analysis of the series as a whole from the standpoint of those factors thought most likely to affect the incidence of infection and delayed wound healing. The basic data are not very satisfactory in the category listed as chemotherapy at time of injury The data were taken from the individual field records. No account is taken of the duration of the therapy or of the dosages employed. In some instances perhaps only a single dose was ad ministered It is possible that some patients did not receive the chemotherapy that the record stated they were given it is probable that others were given some prophylaris (since it was Army routine) in spite of the fact that it was not men tioned on the record. In busy forward hospitals where the highest priority is given to the care of the seriously injured, errors in recording data

that have no great bearing on management of the lightly wounded are readily understandable. (Dates of injury and operation by way of con trast, are very reliable) Although there is an apparent increase in the incidence of infection in those who received no chemotherapy at the time of injury and although it is of great importance to determine its value further analysis in this paper is not warranted. It is of passing interest, however that what data there are are in keeping with the conclusions of this study (This holds true for German prisoners as well a majority of whom received chemotherapy when injured.)

Factors presenting significant increases in the incidence of both infection and delayed healing are the following wounds in German prisoners wounds yielding pathogenic bacteria when cul tured at the time of closure and finally wounds in patients who did not receive oral sulfadiasine at the time of closure. Perforating wounds, delay in closure of the wound or delay in preparing it for dosure, closure of the wound by block excision (usually related to delay) and failure to receive

TABLE VIL-INCIDENCE OF INFECTION AND DELAYED HEALING (15 DAYS OR MORE) IN WOUNDS GROUPED BY FACTORS ACTING AT TIME OF SECONDARY CLOSURE OR LATER-GERMAN PRISONERS EXCLUDED

	Tetal		Infection		} _	Delayed healt	*	
Factor	ORCHER.	Number	Per cent	Simifcast difference	Number	Per cost	Seed from	
All wounds	.59	24			4	1.8	-	
Asserbetic Local	44	,		ĸ	,	-	Ke	
General*	1	rı	13	7 "	19	17	7 ~	
Number of wounds closed at operation Single wound	75			Xe.	10	,	) Ye	
Two or more	84	1.8	,	7.	14	et	7 -	
Aurobic culture of womel at operation No pathograic strams		1		Ym				
One or more pathograic strains	**	10	111	]	,	14	Yes	
All cultured wounds	37	×	17		7	•	-	
Operative precedent Would excision	<b>D</b>		44			14		
Wound revision	35	10	19	) н	7	**	) šie	
Shaple closure	65	-	1	1	,	20	1	
Topical militaritemide Deci		_ ,		Ke .	4	3	χL	
Not med	13	19	11	~	14	10		
Wound tendon t cloners Moderate or marked			**	Ke	s	<b>84</b>	Ne	
Not significant	1,40	- 29	#1		3	16		
Dreinage of wound Wound desired	,			N	4	Jτ	, Ka	
Wound not dramed	2.46	11	3	"	4	76		
Chemotherapy at tone of closure No chemotherapy	13		44			п		
Oral soifachanna				100	1	- 4	X•	
Oral gulfarinales	,	•	3		16	ч		
± Prescritor Partellita only	1		80			ge.	i –	

"Georgi anotheric include two minel anotherics.

chemotherapy at the time of the original injury all show significantly increased incidence of in fection but not of delayed healing

The apparent susceptibility of German prisoners to infection demands further investigation. Cross analyses of the principal factors affecting infection in this series with respect to each other (not shown in the paper) demonstrates that in each separate category there still exists a significantly increased incidence of infection in the group of German prisoners as compared with United States soldiers. The most natural assumption to make in connection with poor results in German prisoners, namely, that it is largely due to delay between time of debridement and closure (with resulting block excision of the wound) is refuted by Table IV which specifically compares the prisoners with United States soldlers on these two counts combined. Whatever the reason for the increase, whether debilitation, faulty nutrition or some other unsuspected cause, it is desirable to exclude German presoners from further analyses of the effect of prophylactic chemotherapy

Table V is an analysis of infection and delay cross analyzed by the location of the wounds. When corrected by excluding German prisoners, it can be seen that location is not a factor of much

significance in this series.

Tables VI and VII repeat the analyses of Tables II and III excluding German prisoners. Partly because there are fewer cases (and the per centage differences must be correspondingly greater to register as significant) and partly be-

TABLE VIII -EFFECT OF ORAL SULFADIAZINE ADMINISTERED AT TIME OF SECONDARY CLOS-BLE VIII—EFFECT OF ORAL SULFADIAZINE ADMINISTERED AT TIME OF SECONDARY CLOS-URE CROSS-ANALYSIS BY FACTORS WHICH TEND TO FAVOR INFECTION AND DELAYED

TIOERR	TAZINE AD	TO FAVOR	
HOERR OF OF OF OR ANALYSIS URE CROSS-ANALYSIS URE LING-GERMAN PROPERTY OF THE	AT SULFADIATION T	END 10	
OF OI	CAL STORS WHICH		
- WITH -EFFECT WEIS	BY PACTUDED	a alon	
ABLE VIII	TECNERS EXCENTED	niection water	zine treated
TIRE CROSCEDMAN PR	Incoence	541194	
TTE ALING-GERE	The same of the sa		± Penkellin
TABLE VIII —EFFECT OF OI URE CROSS-ANALYSIS HEALING—GERMAN PR	CHECK CO.		
THE PARTY OF THE P		Sulfadiazina only	1 run Per cent
THE REAL PROPERTY AND ADDRESS OF THE PARTY AND	K chemotherapy		Talector.
		Per ce	nt Cases 17
	·		107
Factor	Per cent	Cares Indian	
1 Menns		1 1 0	10 1
	1 (1)	1-	50 10
	1 11 11	14	
	6 75	- <del></del>	14
	T	1 11 1	•
All wounds	10 1		- La L
Perforating workds	14 58	_	13 20
Patricia	1 1		
Mo charactherapy at time of lajor			1 1
A washersty at the			10 1
	3		• 1
days or thore		4 3	
days or more recent to closure	×2000   11	20 14	10
or more prepara			16 3
la general hospital Local anosthesis t time of close	13	4 1	
time of con		3	
Local anadiscus	16 1	71 13	1-1-3
	1 5 1		
	1 1	10	6 7
William Street	1011		97
Wound revision		n 3	1 6
		6a	69
900	10	10	5 1
Topical selfamics			
Tierd.	1	75 1 43	to about these would
Not weed			What there is a staide the general
Not made closes	at said a skitch	mable IV)	them to fall outside are not
Two or more wounds closes	a length, or 3 cm. or more in width.	- the in Table and ca	What there is about these wounds What there is about these wounds use them to fall outside the general use fruther analyses are not lear Further the recorded as a
Two or affice	length, will vie	33, the should be	-lenr Fullula la be recoluit

Founds 6 can, or more in length, or 3 can, or more in width.

cause most of the differences are actually less, the only factors which continue to show significant only across in the incidence of infection are the presence of pathogenic organisms in the wound at time of closure and the lack of prophylactic oral sulfadiazine at the time of closure. However ex pected trends in other factors are still discernible although not so marked. It becomes worthwhile at this point to cross analyze these influential factors separately from the standpoint of prophylactic chemotherapy at the time of closure.

In Tables VIII and IX the incidence of infec tion and delayed healing is considered from the standpoint of those factors appearing to favor their development as related to the use of oral sulfodiazane. Significant differences are not in dicated on these tables, because the break-down produces wound groups with relatively few wounds It is intended to show a trend however demonstrating a lower incidence of infection and retarded healing in the sulfadiazine-treated cases in almost every category. The only groups of wounds which fail to support this trend are those wounds requiring prolonged preparation and those wounds treated either by excision or revision and closure (This is also demonstrable

that should cause them to fall outside the general trend is not clear Further analyses are not enlightening, and it must simply be recorded as a

Table \ considers the problem of the serious infection In none of these patients did infection threaten life but in 18 wounds the infection was definitely more than trivial. There is again seen a sharp increase in the incidence of serious infection in German prisoners and again an increased incidence in those wounds not treated with prophy lactic sulfadiaxine There are insufficient cases to render the difference significant in either prisoners or United States soldlers considered separately although when they are combined there is a significant advantage for the group which re-

Table VI is a breakdown of the 73 consecutive ceived sulfaduzme wounds which were aerobleally cultured at the time of secondary dosure. It is unfortunate that all the wounds in the series were not cultured since the cultured group is not quite representa tive of the series as a whole (there is a higher incidence of infection than in the entire series) The common pyogenic organisms are considered TABLE DC.-EFFECT OF ORAL SULFADIAZINE ADMINISTERED AT TIME OF SECONDARY CLOSURE, CROSS-ANALYSIS BF PACTORS WHICH TEND TO FAVOR INFECTION AND DELAYED HEALING-GENIAN PRISONERS EXCLUDED

Incidence of delayed healing (15 days or more)

{				Solisiisis tressed							
Factor	N	o chemother	*47	\$4	čistaska e	<b>≠</b> ∀	Seifudiation ± Penicija				
1	Care	Deby	Per cent	Curs	Deby	Per cont	Cases	Delay	Per cost		
All weekeds	21	10	21	8.0	5	•	107	116	1		
Perforating wounds			45	E4	f	1			1		
Large wounds*			43	34			60	3	13		
N chemotherapy t those of ladway		•	-	*	1		14	1	7		
days or more driny from difficiely most to closury	ſ	5	u	~		14	48		,		
S days or more preparation of wound in general hospital		,	67			4	17	,	us.		
Local anesthesia at time of clurers	,	6	14	14	•	7	ro	1	6		
Procedure Wated suchion	26		23	24			ų	,	13		
Wound revision	,	,	4	3	{	}	14	•	1		
Margin classes	,	,	72	43		•	SJ.	1	•		
Tepkal salitadismble Oued	I.e.	1	-	13		•	-		,		
Mot used	ы		36	64	1	•	97	,	3		
Two or more wounds closed at opera- tion		1	ás	7		,	a)		23		
Delay is injected wounds	14	-	17				11	,	39		

<sup>&</sup>quot;Waterds 6 cas. or more in length, or 3 cas. or more in width

and again the analysis is subdivided according to the nationality of the patient. The numbers are so small that percentages have not been used, but the over-all trend slightly favors the wounds in which prophyractic sulfadazine was employed. Once more this is less convincing in the group of German prisoners apparently being a German prisoner had a more decuive effect upon the healing of the wound than any other factor concerned. Since as many as 5 wounds were closed at one sitting upon a single patient, and since the chemotherapy employed on the patient affected all 5 wounds equally, the objection might well be raised that it is utalair to treat the wounds statistically as separate from the patient. For example, 15 wounds on 3 patients not receiving sulfadiation might all become infected and they might all have been the result of three breaks in operating room

TABLE Y -EFFECT OF ORAL SULFADIAZINE ADMINISTERED AT TIME OF SECONDARY
CLOSURE UPON INCIDENCE OF SERIOUS INFECTION

		All custos			U\$ soldiers			Guernan prinances		
	Caucs	Servere miectron	Per cres	Cassa	Bricus Infection	Per cest	Care	Series SafeCture	Per cest	
All secods	1870	\$2	t.e	Epp	10	7	23			
No chanotherapy	44	TP	1)	ı	3	16		1	43	
Oral sulfactions	197	1	,	•	1		н			
Oral milheliarism + Peniculus	143	•	•	17	•		24			

so periciffe treated cases excluded, no perious infection developed in any of these

There is admits an increase to the lacidence of extrem infection in the "Ye chemotherapy" category for all coses, attempt not for the subgroups of privaters and U.S. selders,

# ORAL SULFADIAZINE AND SOFT TISSUE WAK WOUNDS

TABLE XL-INFECTION IN WOUNDS CROSS-ANALYZED WITH RESPECT TO AEROBIC CULTURE XL.—INFECTION IN WOUNDS CROSS-ANALYZED WITH RESPECT TO AEROBIC CONTURED TIME OF SECONDARY CLOSURE AND PROPHYLACTIC ORAL SULFADIAZINE—73 CONSECU

HOERR OR  BLE XL.—INFECTION AT TIME OF SECON	AL SUL	MULL		ED WIT	H RESPEC	LEADIAZI	NE73 CC	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
HOERR OR  BLE XI.—INFECTION AT TIME OF SECON TIVE WOUNDS	_	-mc CRO	SS-ANALY	TVI ACTIO	OKAL 30			THE RESERVE	
	IN MOD	NUS CITOE A	ND PROPE	11111-		CONTRACTOR OF	Onl sold	derive	
NE XL-INFECTION	MARY CI	WOUND !-		-	CHARLES CONTRACTOR		± Per	cillin	
AT TIME OF SECON	12		ECHT PROPERTY.	1	Oral salis	dierin		Infection	
WOUNDS	THE RESERVE OF THE PERSON NAMED IN COLUMN		No check	therapy			Cases	Institution	
TIVE	477 ==	ands \			Come	Infection		·	
CONTRACTOR OF THE PARTY OF THE	VII -			Infection	1	13	l	-	
,		Intection	Cases	13	44	1-3	96	1	
	Cases	133	15	1	T ,_	1	_	1	-
	73	1	-	<u> </u>	10	7	6	\	-
All wounds	13	7 3		1 6		T _		8	
All words		ro		-		7	1		
German prisoners	35		10	1-6	14		13		_
	_		-	<del></del>	-	1	7		
						<u> </u>		7 -	
Staphylococrus aureus		5				1		1	
Staphysecon	1		1	- 6	·		٠ ١		
Staphylococcus albus	-		6		7.	6			
Supplemental bettern	8			1 1			_ \ .	1	
		-   .			_	s		T _	
Other streptococus aurres and streptococcus aurres and streptococcus aurres and streptococcus aurobytic	- 1 4			.	4				_
Stephylococces bemory to			7	_	3 -				
U.S. soldier only	١	<u></u>	• -	<u> </u>					
U.S. solder only Staphylococcus arrests		17							1
ALDES		_   _	<u></u>	• -	<del></del>		. \	,	
Streptococcus hemoly	tices	· T-	4		. 1	- 1			_
Strepetto	1			. 1	^ \			10	
Other streptococci	-	١٥	5			• \	5		
Staphylococcus altre Staphylococcus alto	~ \			_ \			•		4
			. 1		-	1		•	
			11	4		• _		· .	
German prisoner only Staphylococcus and	-	13							5
A Description of the last of t			-3		-			7	
Streptococcus her	olytica		3		_	7			_
Streptocotta	4			1				a-melomed	in 13
Other streptococ	-	٠.١	• \				Infection (	around he	aling
Stanbylococcus (	alben and all				no chemo	merapy W	a delayed	leveloped wound he	erved

Staphylococcus agrees Staphylococcus albus and all atreptococci technique. This would obviously upset the entire series in a way not shown in the previous tabula tions. Table VII deals with the series as patients rather than wounds. (A discrepancy of 3 extra patients shown in this table is accounted for by the fact that in 3 cases wounds were closed at two alttings a week or more spart for the purposes of this analysis the patients were regarded as new patients at the second operation.) An infection developing in any of the patient s wounds causes developing in any of the patients a "fifection" that patient to be listed under "fifection" that patient to be listed under "fifection". The over-all similarly with delayed healing advantage for the sulfadiarine-treated patients is

once more demonstrated as a trend. The bulk of the cases not treated with sulfa diamne were in the early part of the series. A final objection might be raised that improved results came about as a consequence of better treatment of the later wounds (when experience was greater) rather than from the use of the sulfadiazine Of the first 75 wounds 30 received

no chemotherapy Infection developed in 13 of the 30 and there was delayed wound healing in II Of the second 75 wounds, 12 received no chemotherapy and in these 12 there was infec tion in 8 and delayed wound healing in 5 In the last 50 wounds 2 received no chemotherapy with no infection and no delayed healing. Al though the majority lie in the first 75 wounds a high incidence of infection also occurred in those wounds placed later in the series.

Numerous cross enalyses of the data have been made which are not included here. They have all followed the same general trend showing an ad vantage for wounds treated prophylactically with oral sulfadiarine. It is believed that all the contradictory evidence has been presented. DISCUSSION

Attention has been drawn to weaknesses in herent in an analysis of this particular group of wounds from the standpoint of the effect of

TABLE XIL—INCIDENCE OF INFECTION AND DELAYED HEALING (15 DAYS OR MORE) IN PATIENTS EFFECT OF ORAL SULFADIAZINE ADMINISTERED AT TIME OF SECONDARY CLOSURE

Incid		

		All petients			U.S soldiers			German primeers		
	Humber	Infection	Per cest	Hember	Laketies	Per cent	Hunter	Infection	Per cree	
All petiests	34	44	33	195	200	95	20	18	62	
No charactherapy*	38	•	44	*	1	30	•	,	63	
Ocal sulfadianies	73	-	97	13		5	90		60	
Oral mifadiantes + Penicilies	•	**	=4	7	1	r#	1	3	41	

<sup>&</sup>quot;The incidence is significantly higher in the "No champtherapy" group in US soldiers, but not in the other groups.

#### Incidence of delayed healing

	***	CONTRACTOR OF	-				-		-
	All patients			U.S soldiers			Ourses prisoners		
	Hunker	Dulay	Per cent	New	Dulky	Per cost	Humber	Daky	Per cent
All patients	134	33	16	Les	*4	3	**	4	11
No characterapy	26	3	34	26	•	24		1	61
Oral saltadisatus	73	14	79	23	6		30	5	*
Oral subledigation + Peniciles	9.2	3	1	7	•	*		•	4

The difference are not significant statistically activated by the scale patient, pieces the patient in the appropriate group, although all the other weeds make here beginning the fact for details ).

In the contract here beginning the patient of the patient of the patient in the appropriate group, although all the other weeds make here beginning the patient of the

prophylactic sulfadiazine. They lie in the small size of the series, and in the fact that therapy was not originally planned as a research project. On the other hand, the series is personal, consecutive, and accurate observations on the fate of each wound are available—a set of circumstances not frequently met with where battle casualities are concerned.

A number of factors affecting wound healing and development of infection have been analyzed German prisoners were shown to have a high incidence of infection and delayed healing ir respective of other factors, and the bulk of the analysis has therefore excluded them. It has been shown that wounds which were excised and closed, or which had prolonged delay before closure did not appear to have a significant response to prophylactic chemotherapy the reasons for this are not clear Wounds in nearly every other category appear to benefit by a course of oral sulfadiazine given prophylactically at the time of secondary closure. The general trend is rendered more significant by the fact that by and large the worst wounds received chemotherapy on empirical grounds in the interest of obtaining the hest possible results. (Evidence for this state ment is the high incidence of infection and delayed healing in the small group of wounds in which

both sulfadiazine and penicillin were employed prophylactically)

Suggestive evidence that prophylactic chemically at the time of the original injury—days or week's before the patient reached a general hospital—decreases the incidence of infection after secondary closure was not pursued became of the likelihood of error in the recordings on the field record of the patients. A consideration of the value of topical sulfanllamide employed at the time of secondary closure is likewise beyond the scope of this paper.

It is recognized that the conclusion in this study is at variance with those of Meleney ar rived at in an elaborate statistical study of a much larger series of cases. The two series are not strictly analogous, however. These are wounds produced by the mussiles of war as opposed to wounds incurred through civilian traums. These are wounds in which closure is delayed deliber ately for days or weeks after infury as opposed to civilian wounds the vast majority of which can and should be closed as soon after the original injury as possible. Finally these are wounds in patients who have already received, for the most part, some type of prophylactic chemotherapy perhaps this early chemotherapy inhibits the growth of certain bacteria which lie latent in the

wound until stirred up by operative closure when they will produce infection unless inhibited again by another course of chemotherapy. Perhaps this early chemotherapy renders the wound more susceptible to infection at later operation than it would have been had no prophylaxis been used at all and the wound permitted to develop unaided its own local tissue immunity.

#### CONCLUSION

A personal, consecutive series of 200 secondary closures of soft tissue war wounds is analyzed

from the standpoint of the prophylactic effect of sulfadiazine administered orally at the time of closure.

The evidence presented favors the view that sulfadiazme so employed is beneficial and that it reduces the incidence of postclosure infection and delayed healing

## REFERENCES

 Самгикії, Н. Е. Surgery 1941 9 825-831
 Миленич Рими І. Surg Gyn. Obst., 1945 80 263 296.

# THE PELVIC AUTONOMIC NERVES IN THE MALE

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UMEROUS descriptions of the pelvic plexus of nerves are to be found in the literature. Although some of them are excellent neurologically none provides scrilally arranged liburations prepared from actual gross dissections. In the present article it will be the authors sole purpose to portray the structure of the pelvic plexus and associated nerves in atlas fashion, with description of related layers and organs.

#### LITERATURE

Anatomy According to Davis (1933 1934) the pelvic plexuses consist of interlacing groups of nerve fibers and of many but extremely small ganglia situated on either side of the ampulla of the rectum. The dimensions of each plexus are said to be 2 by 3 by 1 centimeter. The two plex uses are described as embracing the rectum in the manner in which the levator muscles embrace the anal canal. On each side the plexus is bilaminar the medial sheet being a continuation of the hypogastric nerve, the lateral a prolongation of branches derived from the sacral nerves. The two hypogastric nerves are joined at a lower level in the pelvis by parasympathetic fibers of the second to fourth sacral segments, these fibers making up the nervus erigens. The two contributions, together with sympathetic fibers from the pelvic chain ganglia, form the pelvic plexus.

The central connections, according to White (1935) are made up of preganglionic fibers from lower thoracic and upper lumbar levels of the intermediolateral columns of the spinal cord. Cells send out axones over the white rami of the lower thoracolumbar outflow to lumbar and preaortic ganglia. Postganglionic neurona originate in sympathetic trunks as well as in prescritic ganglia to form a plexus which descends with the abdominal aorta. At the level of the inferior mesentene artery are situated two small ganglis which, supplying a circumarterial plexus for branches of the inferior mesenteric artery ultimately innervate the sigmoid colon and rectum. The remainder of the descending sympathetic fi bers form the superior hypogastric plexus in the region of the bifurcation of the aorts. The plexus divides into two plenform sets of nerves which

Contribution No. 444 from the Anatomical Laboratory of Northwesturn University Medical School, Chicago, Illinois enter the pelvis, along its lateral wall as the hypogastric nerves (or plexuses)

Pelvic roots, forming the nervi erigentes, arise from medial aspects of the auteuro primary divisions of the second to fourth sacral nerves, 1 to 2 centimeters from their foraminous exits. They course to the pelvic pleasus, or directly to the rectum. Two or three fine twigs arise from each of the ganglia of the sacral sympathetic chain and enter the posterior border of the pelvic plems.

The urinary bladder receives sympethetic fiber from the collect, renal, and measureric agains, as well as from the first four lumbar ganglis of the sympathetic chain. These fibers, by way of the hypogastric plexmes, and in descent into the petvis, receive fibers from the last lumbar ganglis, from the infersor measureric plexms, and from the superior hemorrhoidal nerve. They also receive fine filaments from the sacral sympathetic chain.

The parasympathetic fibers (from scrat roots) first gathered together as the nervi erigentes, separate into three groups the upper supplies the funding of the bladder the middle supplies the midportion of the bladder and the lower course to the inferior aspect, the vesical neck, and the addrects portion of the urethra.

The cells of origin for these efferent fibers (parasympathetics) to pelvic organs lie in the intermediolateral column of the sacral region. The locations of cell bodies for the afferent fibers are so yet undetermined, but are probably in posterior root gaugin.

The prostate and seminal vesicles receive their innervation from the middle group of fibers while the rectum is innervated by the inferior group and by some fibers, which, remaining independent of the pelvic pleans, are sent directly from the hypogastric nerves and chain gaugits.

Physiology The sympathetica, according to Davis (1934) and Meigs (1946), behave as viso-constrictors and as inhibitors of the musculature of sigmoid colon, rectum, and bladder They cause circuistion and contraction of the spinote of the bladder Pseudosensory properties are regarded as vacomotor in foundation. The fiber are also glandulomotor to both superficial and deep visuals.

The parasympathetics produce vasodilatation and release of the various sphincters. They mediate pain sensation from the bladder. Section of

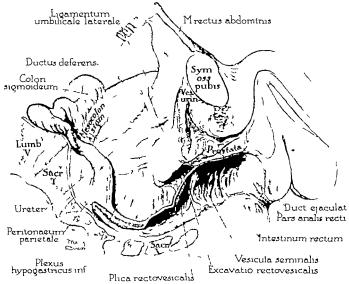


Fig. 7 Topography of the hypograstric plexus and related pelvic structures in a hemacated specimen peritoneal level (successively deeper levels of same specimen in Figs. 2 to 6). The left half of a male pelvis peritoneum intact. The action pames through the entire length of the rectum

and through the urinary bladder urethra, etc., and prostate (atter hypertrophied) The section also passes through the interpublic fibrocartilage, seminal vesicles, retropuble plexus of veins, scrotum, and penife cavernous tissue.

the superior hypogastric plerus does not cause atrophy, or disturbance of any motor functions of the bladder excusion of parasympathetics would cause increased blood supply to the pelvis, a diessening of visceral muscle spasm and interruption of pain impulses to higher centers. Schroeder (1939) quotes McCrae and McDonald (1934) as doubting if either system (parasympathetic or sympathetic) is exclusively excitor or inhibitor these authors believe the two work together and with somatic nerves, to regulate bladder function Let they are of the opinion that the parasympathetics are more important and that they carry the stronger impulses.

Surgery Jaboulas (1899) first directed attention to the fact that pain could be relieved by

surgery of pelvic sympathetics. Although Latar jet (1913) adequately described the pelvic sympa thetics, the first presacral neurectomy was reported by Cotte (1925) Pieri (1926) tried Cotte s operation for relief of pain in tuberculous cystitus finding the surgery only partly successful he next excised, with more satisfactory results, the lateral sacral chains at the level of the first sacral segment, and the communicating rami thereof Learmonth (1930) employed Cotte s method in an attempt to correct neurogenic imbalance of the bladder. More extensive reports were made by Davis (1933 1934) and Meigs (1940) on the relief of pelvic pain by presacral neurectomy Schroeder (1939) enumerates several operative procedures for relief of bladder pain excision of the superior

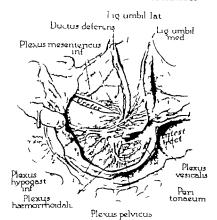


Fig. 2. Topography of the plermes, unter and doctor deferms immediately subpertioneal level. Showing the structure related to the pelviceon and return, namely surter Badder Biguanetts, and others. The parietal peritoneum of the lesser pelvis has been removed, and, additionally, the vesical part of the videral peritoneum. The senson layer remains as the pelvic mesocolos, the covering of the colon and rectum, the rectover of fauch and also as the binaminar seption which descends between the blad der and rectum and rectum (fascia of Demonvillers marked by arrow here and in Fig. 7. The oreter doctors deferen, unbibliod Biguaneti (obliterated artery) and nerves have been freed from the thin stratum of subpentional areolar tissues.

10-

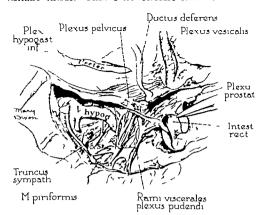


Fig. 3. Relation of the hypogratic plexus to the terminal vesscal plexus, and to the deeper rami derived from the acropulential plexus. The latter are situated at parietal level. Depecting the rectum urinary bladder ductus deferens, ureter pelvic autonomic nerves, and related structures. The following have been removed pelvic colon proximal part of rectum (dustal segment retracted) superficial leaf of autonomic nerves to the point of severance of the rectum (opposite fifth sacral vertebra). The nerves are followed toward the rectovescal excavation the ductus deferens is modifized as far as its point of junction with the seminal veside where the associated nerves Be within the rectovescal fold. The hypogratic and plated veins are exposed. The sacral sympathetic chain with communicating fibers from the second to the fourth sacral, is exposed, as a also the sublacent piriformis muscle. The layers shown are in succession. Hypogratic and pelvic plexuss lodged chiefly in subperi toneal areolar tissue heavy retroperitoneal connective tissue, upon which the visceral branches of the above named plexuses rets or through which they pass visceral rams of the sacropodendal plexus of nerves musculature (pariformis, passing from the secrum through the greater staits formacm).

nerves and related structures they were prepared at his size.<sup>1</sup> An accessory illustration (Fig. 7) reduces the nerves to a schema. The diagram matte sections (Figs. 8 and 9) are based upon a coronally cut pelvis of a second male specimen Between the prostate gland and the rectum it descends as a partially fused plate of tissue termed Denonvillers fasca (arrow Fig. 1).<sup>2</sup>

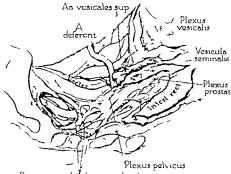
#### OBSERVATION AND DISCUSSION

Persioneum. The persioneum is elevated by the obliterated hypognastric (umbilical) artery slightly by the superior vesical branches derived therefrom and by the ductus deferens and ureter (Fig. 1)

Comparable strate in the female polymewre illustrated in an earlier article (Figs. to 4) Cartis, Assen, Askley and Jones, 04.)
The reader is referred to the excitent article on Deceavallers fascia by Tobia and Benkincin in an earlier volume of this paral.

The rectovesical fold is prominently tall it is little more than apposed layers of peritoneum projects i centimeter backward from the bladder the excavation which it guards is 1 5 centimeters deep, measured from the edge of the fold to the depths of the rectovesical excavation. The transverse vesical fold is but a slightly elevated part of the peritoneum. The lateral umbilical fold has a maximum height of 1 5 centimeters (at the public crest), the fold is flattened so that its space opens lateralward.

The pelvic colon possesses a mesocolon which is 6 centimeters long where the colon reaches the midline over the fourth lumbar vertebra (Fig. 1) the mesenters becomes gradually shorter being 2 centimeters long in the true pelvis opposite the first sacral vertebra fixation occurs at the level



Rami viscerales plexus pudendi

Fig. 4. Form and composition of the deeper leaf of nerves. Showing the pelvic plems, the superficial leaf of which has been entirely removed to even be deep layer of the pelvic a tonomic plems and the nerves contributing to its f brie. The nerves from the second 1 fourth scard lettings i remain intext, and the anterior continuation of the pelvic autonomic plems has been followed ventralward to the bladder seminal vesical, and prostate. The rectum, transcrient at except level, has been retrained. The slarge reduced the rectum form of the pelvic autonomic plems has been followed when the level may be a large reduced to the rectum of the pelvic leaves the respect to the pelvic set of the pelvic leaves the respect to the pelvic set of the pelvic leaves the respect to the pelvic set of the pelvic leaves the pelvic l

of the ridge between the second and the third sacral segments. The pelvic colon is constricted through the greater part of its length. The rectum is similarly constricted as it lies in front of the third and fourth sarral pieces it widens slightly in front of the fifth, and further enlarges as it passes distalward beyond the arra of vertebral relationship. The narrowed anal canal leaves the rectum at an angle of almost 90 degrees. The three portions of the tube are then, related to one another as the parts of a letter Zreversed.

Subprenent structures The beavier retropen toneal (tissue which ascends on either side of the urinary bladder as a wing to that level, in projecting backward forms the plate of tissue over which the pertoneum is draped to produce the rectoverical fold (Fig. 2).

The observations on the general arrangement of subperitoneal tissue are in accord with those made earlier on the female (Curtis Anson, and

Beaton 1940 Vessels in the category of the bemorrhodals are lodged in a fine areotar layer which is immediately subpertioned, autonomic nerves coursing to viscens are next in level, becoming more superficial as they approach the organs parietal vessels are placed in the heavy connective tissue which is clearly "parietal" and with them are situated visceral rami most deeply placed, and actually retrofacial, are the elements of the sacral and lumbar plexuses, from which alter communicating rami are sent through the heavier retropertoneal tissue to reach the autoomic plexuses near the bladder and rectum.

The ductus deferent, areter and accompanying nerves lie within a thin areolar layer with the middle hemorrhoidal and associated sympathetic plexus (which give off rectal, vesical, and prostate sets of nerves). Still covered by tissue of areolar character but evident as elevations, are the "obliterated" hypogastic artery (lateral umbilical ligament) and its derived superfor vesical colligament) and its derived superfor vesical.

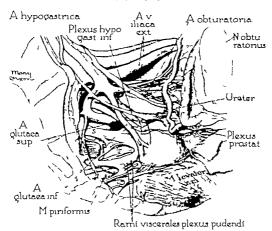


Fig. 7. Parasympathetic origin of the rand contributory to the pelvic piems, and deep structures related to the latter. The deep relations of the pelvic piems, also hypermoval of the plevic piems, aboven by removal of the plevic piems, aboven by removal of the piems and the beavy retrogeritoneal tissue which partially invests it. The transacted parasympathetic nerves (viscear rani) of the pudencial piems) remain connected with the sacral plevus the distal continuations of the automorales have been cut as they disappear beneath the pressate and serimal vesicle. The connections between the inferior hypogastric plerus and the pelvic plerus have been severed along the inferior margin of the former. All of the retroperitoneal connective tissue has been removed exposing the endopelvic fascia, the vessels and nerves to the pelvic viscers and parieties, and to the lower extremity. The connective tissue has been removed from the greater sciatic formmen to expose the full course of the nerves contributory to the sacral and pudencial plecuses and the larger vessels as they leave the pelvic. The superior fascia of the pelvic disphragm has been removed, exposing the levator and muscle.

branches. The outlines of the gluteal obturator middle hemorrholdal and pudendal vessels are masked by the heavy retroperatoneal layer

Nerses' Most important is the position of the several sympathetic pleanes (Fig 2 of Fig 7). They are parietal in position they do not immediately surround the organs as familiar textbook illustrations would lead one to believe. Actually the large middle hemorrhoidal is actually 5.0 centimeters distant from the rectum it sends numerous rami to the rectum, these passing posteriorly over an area bounded by the line at pelve mesocolic attachment (above) and the line projected (below) from the superior surface of the uniany bladder. In the erect body their direction would be horizontal, while that of the trunk from which they are derived would be vertical.

The deeper structures are chiefly related to the nerves of the intermediate and deep leaves (Fig 3) The intermediate leaf consists of the parasympathetic fibers of the second third and fourth sacrals and sympathetics which enter these just lateral to the chain ganglia. The parasympa thetics (nervus engens) intercommunicate form ing a small plexus which makes up a deep leaf The two layers meet approximately 3 centimeters lateral to the rectum Some of the fibers of the parasympathetic derived from the fourth sacral diverge medially to enter the wall of the rectum The intermediate leaf is separated from the deep (sacral plexus) by the large hypogastric vein and its glutes tributary The vein in turn crosses the puriformis muscle obliquely From the large gan glion resting upon the lateral surface of the body

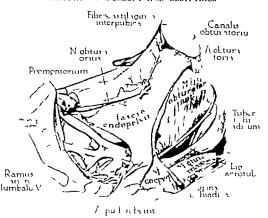


Fig. 6 are lybe—th then t=10 a possibility blees (cut)—in Japaicial of related to plantamate modes and (see 3 % of utroomly the remove). The graph partials of the large—resel ha. I been removed by goodly her proposed to the observation of the large—resel has been followed to be observed to the observation of real through the greater scattle featurent t=1; it of one ergors—of the trank t from the scattle of possibility of the content of the conte

of the first sacral vertel ra many small fibers course over the sacral artery and hypingal tric vein to supply these vessels, some reach, and supply the hypogastric artery and its branches. I rom each of the ganglia a gray ramus ommunicans may be seen paying deeply through the juli-tance of the pinformis muscle to the sairal nerve of it. corresponding segment. The deep leaf of perves consists mainly if the second third and fourth sacral nerves. At their points of emergence from the bony foramina the second is 0 5 entimeter wide the third is 0.4 centimeter and the fourth is 0.3 centimeter in width A distance of a 5 centimeters separates the second from the third 14 separates the third from the fourth. The height of the "arch" (measured transversely) between second and third is 2 o centimeters, that between third and fourth is a centimeter. At the point of union of the three components the band is 25 centimeters with (measured vertically)

The configuration of the Frankenhaeuser pleus and its comps next becomes clear when the super ficial leaf of nerves has been rem ved (Fig. 4 of Fig. 7). The sympathetic nerves fin superior and lateral origins f rm the inferior hypogastre pleus of hypogastre nerve thes are joined by the small pleus formed by the parawingsthetic nerves from the second to fourth sacrals. The two systems then blend into a single large flat hand overlying the deep vessels from the hypogastre. The shape is that of a large. I have sympathetics forming the lateral arm the parasympathetics, the medial. The fusion of the two continues as one large flat sheet composered of many nerve filters and sheaths of connective tissue. The flates and sheaths of connective tissue. The flates

urethra to innervate those structures. There is a separate group of small fibers which passes into the region of the seminal vesicle. Some fibers detach themselves from the plexus to supply the terminal portion of the rectum

The superiorly located fibers of the plerus pass beneath the seminal vesicle and the crooked por tion of the ductus deferens to enter the wall of the bladder. The lowermost, as previously men tioned, enter the rectum, and intermediate fibers continue to the prostate and membranous ure the

The distance from the mid point of the plexus to the lateral rectal wall is 3 5 centimeters. The length of the Y-shaped plexus is 8 centimeters (to the nerves at the prostate)

The parasympathetic nerves are five in number (Fig. 5 severed at the point of entrance into the plexus). The cranial two arise from the junction of the second and third sacrals the third arises from the third sacral, the fourth nerve from the fourth sacral entirely, and the fifth from the junction of the third and fourth. The plexus is prolonged between the rectum and prostate the plexus was previously described as an intermediate group of nerves leaving the plexus and entering the prostate, the inferior aspect of the bladder and the seminal vesicles. The inferior or caudal, group of nerves leaves the plexus to enter the ampulla of the rectum as three or four stems of gross dimensions.

l essels The hypogastric artery and its branches and corresponding veins he deep to the fascial layers which house the autonomic nerves (Fig 5) The most superiorly placed vessels are the external thac artery and vein. Next is the um bilical artery with its four vesical branches, all of which course first toward the superior surface of the bladder some then passing to the inferior The vesical arteries are lodged in an intermediate layer of connective tissue which covers the deep vessels and remains entirely separate from them The small deferential artery takes origin from the lowermost of the vesical arteries the ureteric ar tery also in this layer arises from the small vesi cular branch just above the one which gives origin to the deferential. Another small artery passes directly through the plexus to enter the tip of the seminal vesicle. The obturator arises by a com mon stem with the umbilical the gluteals descending leave the pelvis above and below the piriformis muscle. The inferior gluteal artery gives rise to the internal pudendal just before it

leaves the pelvis.

The vessels are internal to the endopelvic fascia (Figs. 5 and 6)

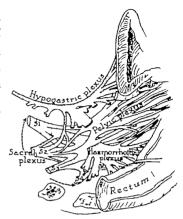
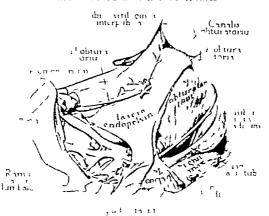


Fig. 7. Dagram of the pelvic pleans, showing origin and dustribution of the chief components, and their gross interrelationships. Medial aspect. The hypogastric pleans is shown intact in its curving course to the urinary bladder but has been cut away in that part which, overlying the pelvice pierus, contributes to the hemorrhoidal pleans. Between these two, and lateral to them, the fibers derived from the sacral nerves are shown streaming toward the bladder protate, and cand, rectum etc.

The endopeluse fascia The so-called endopeluse fascia is actually aponeurotte in nature Continued upon the levator am and coccygeus muscles the endopeluse fascia becomes disphragmatic fascia (Fig 6). Over the upper part of the obturator internus muscle it is parietal and when reflected from the peluse disphragm to the rectum and bladder it becomes visceral (cf figures in Curtis Anson and Beaton, 1949).

It is clear, then that the relations to fascial levels are of fundamental importance. In the heavy retropentioneal layer is located the large pelvic plexus, with its vesical and prostatic continuations (Fig. 4) into this layer sink the originally superficial fibers of the inferior hypogastric plexus (Fig. 2) and to it ascend the visceral rum originating from the sacral plexus of nerves (Figs. 3 to 5). In dissections this set of relationships is strikingly demonstrated when the heavy stratum is reflected (Fig. 3) as they enter the pelvis from above the sympathetic fibers are situated justs beneath the serous layers and upon the heavy



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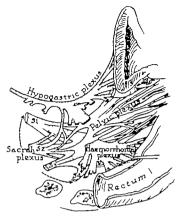
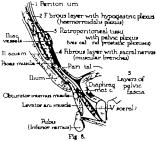


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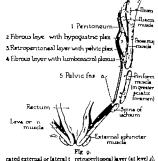


Figs. 8 and 9. Diagrams of the location of autonomic nerves, showing relations of the main sets to the subscrous strata of the pelvis. Coronal sections in anterior view. The chief elements of the broad pelvic plexus are lodged i the heavy layer of retroperitoneal tissue (at level a) hypogastric plexus and its subsidiaries are situated in thinner layer internal or medial thereto (level 2) while the sacral plexus and its fibers to pelvic musculature are lo-

retroperitoneal layer on the contrary the para sympathetics, originating behind, are located beneath the heavy layer and upon the endopelvic fascia as the latter covers the parietal musculature (obturator internus) All of the fibers from these two sources which ultimately reach the progenital organs enter and course through the heavy retropentoneal layer this would be the expected arrangement, since the strong fibrous layer be comes the immediate coat of each of the pelvic organs, merging with the sheath derived from the endopelvic fascla.

Sciatic foramen The sciatic foramen is bounded anteriorly by the arching border of the endopelvic fascus. Through it passes the superior gluteal, inferior gluteal, and internal pudendal ar teries, and the lumbosacral nerves which converge to form the sciatic. The parasympathetic nerves (nervus erigens) also visible, arise just before the sacral trunks som. The most caudal of the nerves arising from the sacral plexus is the nerve to the levator ani.

Ischiorectal fossa. The visceral rami derived from the excropudendal plexus are, then, promi nent as a group where they leave the sacral nerves at the arciform border of the sciatic foramen (Figs. s and 6) But, within the ischiorectal fossa, com parable fibers to the erectile bodies are difficult to segregate they tend to follow inconspicuously the pudendal nerve.



Posteriorly t the greater sciatic foramen its nerves ( t site of crosses in Figure 9) contributing chiefly t the for mation of the act tic nerve rest upon the fascial covering of the pinformis muscle

The ischial spine constitutes the serviceable landmark around it the obturator internus duappears as it leaves the pelvis attaching to the whial spine are the posterior end of the illococ cygeus part of the levator ani, and the lateral insertion of the coccypeus muscle which forms the posterior fourth of the pelvic diaphragm.

#### CONCLUSIONS

The autonomic nerves of the pelvis make up a set of neural sheets which not only are of gross dimensions, but which are of such position and form as to be demonstrable in the form of subpertoreal bands with predictable relationships to bony landmarks, to large blood vessels and to viscera. The large bands and the lesser contributory fibers as they course from root or plexus of origin to area of visceral termination, are either lodged within readily dissectable fibrous laminae or situated at levels either immediately superficual or deep to such laminae.

The chief layer is that which is most marked as it extends upward along the pelvic wall after hav ing formed a strong sheath for the urinary bladder and associated structures. It is the layer which transmits, also, the blood vessels of visceral supply Resting upon this stratum, at subperitoneal level, is an areolar tusine in which is situated most of the nerves of supply to the rectum under the same stratum are placed the sacropudendal plexus and the rami which pass therefrom to the large pleaus in the intermediate layer. The intermedial ate is therefore, the chief one of the three into the pelvic pleaus which it contains pass rami from the sympathetic and parasympathetic pleauses in layers on its internal and external aspects.

In the superficial (internal) layer of areolar tissue course the hypogastric plexus that portion of the pelvic plexus which sends ram chiefly to the rectum, the contributory mesenteric plexus, and the ductus deferens. These are structures which are subpentioneal or were originally mesenterial (when, embryonically a mesorectum existed) Being placed immediately beneath the serous lining of the pelvic cavity they elevate the peritoneum—but less markedly than do the umbilical ligaments (Fig. 1)

Topographically the infenor mesenteric plexus lies anterior to the ureter following it closely the infenor hypogastric plexus and its pelvic prolon gation he post-nor to the ureter between the latter and the rectum. The main mass of the plexus courses in a curving line—concave anteriorly—between the first piece of the sacrum and

the rectovesical fold

In its distal portion the fibers spread out principally on the superior surface of the bladder behind, groups of fibers radiate to the rectum a strong set forming a secondary plexus close to the rectal wall. Altogether these plexuses and derived fibers of visceral supply cover a semicircular area whose posterior boundary follows the contour of the rectum and that of the sacrum against which the latter rests (Fig. 2)

Embedded in the heavy layer of true retropen toneal tissue are the deeper elements of the autonomic supply (Fig 4) The anterior boundary of this set of fibers coincides with that of the more superficially situated hypogastric plexus, but its form is strikingly different. It assumes the configuration of a broad ribbon wider at the proximal and distal ends than in the middle twofourths of its extent Its widest portion is proxim ally situated, where visceral rams are contributed by the sacral nerves (Figs. 3 and 4) upon it converge, distally the fibers of the vesical portion of the pelvic plexus, to produce a second broadening terminal distribution to the bladder prostate, seminal vesicles and rectal ampulla is also instru mental in causing the widening of the band which occurs at its anteroinferior end. In an anteroposterior direction this intermediate band is somewhat more extensive than the superficial the former is carried to the sacrum (the points of origin of the nerves Fig 4) the latter to the rec tum (the visceral area of supply Fig 2) The intermediate band is the longer of the two owing to the fact that the greater bulk of its fibers are supplied, not to the rectum in the sacral curve, but to the bladder prostate, anal canal, as these rest upon the pelver floor

The third and deepest of the three neural strata is that composed of the proximal portions of the visceral rami of the pudendal plexus and the sa cral plexus, from which the rams are derived. Because the branches quickly enter the pelvic plexus-merging on the latter's deep aspect, and within the substance of the heavy retroperitonical tissue-this third layer is but slightly longer than it is wide. It overlies the second to fourth nerves (from which it arises) being thus caudally placed, its long axis is at almost a right angle to that of hypogastric plexus in the superficial, or first layer. The upper cords of the sacral plexus. and the lumbosacral cord from the abdominal level rest in similar tissue upon the piriformis muscle the pudendal rami leave the nerve trunks near the point where the latter emerge through the greater foramen en route to the gluteal region As the rami course toward the pelvic plexus, they come to lie upon the fascia covering the obturator internus.

The sympathetic fibers which descend into the pelvis from abdominal level form the mesenteric and hypogastric plexuses the parasympathetic fibers, commonly described as forming a nervus erigens, enter the pelvic plexus as a set of anastomotic nerves. All fibers, so far as gross examina tion reveals are mixed in the broad ribbon of nervous tissue which is termed pelvic plexus. Therefrom fibers stream toward the several pelvic organs, a degree of stratification obtaining in the distribution to mesenterial and to retroperitoneal viscera for the most part nerves to the rectum pass, on immediately subperstoned or superficial, level, from the anterior border of the plexus back ward in radiating fashion to the pelvic portion of the digestive tube similarly nerves to the urinary bladder subjacent prostate gland to the seminal vesicles, lodged, at the intermediate level in the heavy sheath of retroperatoneal tissue stream downward and forward to the organs named-all ultimately supported by the funnelshaped pelvic diaphraem

From the surgical standpoint the following conclusions seem warranted sympathetic fibers may be transected by presacral neurectomy para sympathetic elements left untouched by the same procedure in both abdominal and perineal approach to the rectum (in high operation for car chroma) the chief portions of the autonomic plex uses are removed by safe distance, from the

surgical field—being parietal in position in the dorsal portion of the pelvic cavity in any of the regular approaches (puble, transsymphysial penneal or rectal) to the urmary bladder or prostate gland the disturbance of tissue would occur in areas where concentration of autonomic fibers is minimal—behind the main plexiform aggregations in anterior approach, and above them in inferior entrance to the pelvis. However in wide removal of carcinomatous lymphatic and associated fibrous tissue within the pelvis, the areas where nerves are abundant would be affected the plexuses, in resting upon the hypogastric artery and its important branches, are situated between the peritoneum and the lymphatics, since the latter are closely associated with the blood vessels.

In summary then, it may be said that the nerves of supply to the pelvic organs are so disposed as to be naturally protected from damage in urological surgery. In spreading out upon the bladder from behind and above, terminal fibers are fewest on the anterior (apical) and inferolateral portions in supplying the rectal and anal parts of the canal the nerves do not descend with the tube in the form of an investing net, but, approaching the canal from the side they end in relation to local

segments. Finally it may be pointed out that so great is the intermingling within the plexus of fibers derived from various sources that localized excision or extirpation would be expected to result In relatively slight interference with function of a pelvic organ

#### REFERENCES

- COTH, G. Press mcd., 0 5, 33 08-00.
  COURS, A. H., ANSON, B. J. ASELLY F. L. and JONES, T. Sung Oyn. Obst., 943, 75, 743-750.
  COURS, A. H., ANSON B. J., and BEATON, L. D. Sung Gyn. Obst., 194, 70 643-654.
  D. AVER, A. A. Belt. J. Song. 933, 80 3 6-526.
  Edem Brit. M. J. 934, 100, 90 02-104.
  J. ANSOLIAV M. Lyon med 100, 90 02-104.
  LATERIER A., and BONNET P. Lyon chir. 1913.
- 9 6 9-044

  8. LEARMONTH J. R. Proc. M yo Chn., 930, 5 54-56

  9. Idem. J. Urol., Balt., 931 55 31-540

  McChra, F. D'A. and MacDonald, A. D. Brit. J.
- Urol. 10,16.6 p. 7.

  11 MEGG, J V. N. England J M., 1940, 223 87-190
  PIXE G Press role, 276, 28, 1141-1143
  3. ROCHET P Lyon chir, 1911 8 463-498
  4 SCHROUNZ, C.F. N. England J M. 1930, 280-274-
- 278. 15 Tonto C. E., and Brospanics J. A., Surg. Gya. Obst.,
- 1945 So 373-388.

  16. WHIT. J C. Anatomy Physiology and Surpical Treat ment of Autonomic Nervous System. New York The Macmillan Co., 935

# STUDIES ON EXOPHTHALMOS PRODUCED BY THYROTROPIC HORMONE

Changes Induced in Various Tissues and Organs (Including the Orbit) by Thyrotropic Hormone and Their Relationship to Exophthalmos

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N a preceding publication (21) the development of exophthalmos in thyroidectomized animals receiving various preparations of thyrotropic hormone was described tuitrin T produced a striking degree of exoph thalmos but in many animals it also produced profound myasthenia and loss of weight in spite of the absence of the thyroid A so called purified preparation however failed to produce exoph thalmos toxic manifestations or loss of weight but did cause some hyperplasm of the thyroid of intact animals. A crude thyrotropic preparation which was prepared in a manner similar to that of the so called purified preparation but without the additional efforts at purification and which was administered in quantities equal in thyroid stimulating effect to the purified product caused exophthalmos. This exophthalmos, however, was less striking than that produced by antuitrin T Toxic effects and loss of weight from the crude preparation were minimal. The specific metabolic principle, a fraction of thyrotropic hormone did not produce exophthalmos and was known from the work of others (8 18 19) not to produce thyroid hyperplasia

The tissues of these animals, from which ac curate data on exophthalmos have been obtained have furnished the source of material for this report

## LITERATURE

In 1936 Smelser (43) described an infiltration of a stainable material accompanied by nests of lymphocytes and edema in the extraocular muscles and orbital fat of guinea pigs rendered exophthalmic by thyrotropic hormone This was confirmed by Paulson (37,39) who also described loss of striations in the extraocular muscles. Smelser (44,46) concluded in later papers that the changes in muscle were confined to the connective

Abrikament of thesis submitted by Dr. Dodynes to the Freutly of the Graduate School of the Investry of Minneyer in reartial fulfillment of the requirements for the degree of Ph.D. in Surgery Work done t the Institt of Experimental Medicine, in the Intonatory of Dr. George M. Higgins.

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tissue between the muscle fibers. Paulson (38 30) later found muscle degeneration and round cell infiltration in cardiac and other skeletal muscles He reported that this change was most striking in the first few days of administration of thyrotropic hormone and that it occurred repartless of the presence or absence of the thyroid cellular reaction was found to a much milder de gree in normal and thyroidectomized control anımals.

Aird (12) demonstrated varying degrees of cellular reaction in extraocular muscles and edema of orbital tissue with several thyrotropic prepara tions Brock (13) although primarily interested in cellular infiltration in cervical sympathetic gan glia mentioned the feature in muscle. Smelser (44) and Paulson (37) reported that the muscle changes might not be present although exoph thalmos developed. Paulson (38) could not de monstrate an appreciable increase of the water content of muscles but in agreement with Smelser (44 47) he did show an increase of the water content and volume of the orbital tissue mass.

Smelser (45) after finding an edematous in filtration in the connective tissue of fat in the orbit studied other fat depots. Cervical and axillary fat were unaffected but the fat about the kidneys, ovaries and ureters appeared to be in volved by the same process although to a much less striking degree than in the orbit. These observations on fat depots other than the orbit have not been confirmed Since the investigation described in this publication was carried out Smelser (47) has described an increase of the residue of the orbital tissues after the extraction of fats and water in animals that have been given thyrotropic hormone

The significance of the cellular reaction elicited by thyrotropic hormone in fat connective tissue and muscle is not understood. Just what the relationship of these tissue changes may be to the exophthalmos that develops is not certain. A cellular reaction accompanied by edema and fibrosis in orbital tissues of patients suffering from



Fig. 1 Left, perhaphric fat from normal control guinea pig. Right, perhaphric fat f om guinea pig treated with antuitin T. Note th apparent replacement of opage fat by a more transparent gelatinous material (transillumina

malignant exophthelmos has been described by Naffziger and many others (ii 12 13 17 22 23 273,13,33,35,43,44,48). It may be of interest that Haik (27) recently reported extreme fatty metamorphosas of the liver' and cloudy swelling in the kidney in a case of malignant exophthalmos at necropsy. Naffziger (34) reporting on muscle biopases from locations other than the orbit, did not observe the muscle changes usually en countered in the orbit.

#### EXPERIMENTS PRELIMINARY TO THIS STUDY

In preliminary experiments, examination of insues of animals receiving antuitina T confirmed these reports of the presence of round cells in orbital tissue, to a lesser degree in muscles, and in many of the fat depots throughout the body. In other preliminary studies it was found that these cells contained many fine droplets of fat. Likewise muscle fibers throughout the body and the cells of the liver and the kidneys were leaded with fat droplets after thyrotropic hormone had been administered.

#### PURPOSE OF THIS STUDY

The purpose of this study was to investigate the possibility of a general systemic cellular reaction in gulnes pag siven anturin T and to correlate these reactions with those known to occur in the orbit associated with exophibalinos. In addition observations were made of the reactions which ensued in animals when they were given various other crude and so called purified thyrotropic preparations. Since the unit potencies of these preparations differed from that of anturin T

any comparison of their effectiveness with that of antuitrin T was not undertaken.

#### METHODS

The several groups of animals that had re ceived various thyrotropic preparations for varying lengths of time were as follows

A. Antultum T was administered in daily amounts containing 25 Junkmann-Schoeller untilto 15 thyroldectomized animals, 7 of which had also been orchectomized. Four intact animals also received this product. The period of adminism tion was from 3 to 32 days.

B The solvent for antuitrin T including the preservative but without the pituitary ingredient, was given in comparable daily doses as a control

to a intact animals.

C Five intact animals with comparable body weights were fasted, to induce a loss of weight like that sustained by some of the animals receiving antutrin T. These served as controls for changes sustained solely from loss of body weight.

onanges sustained solely from loss of body weight.

D A so called purified thyrotropic factor was given to 8 thyroidectomized animals in dally amounts containing 2 5 5,0, and 10 0 Rowland-Parkes units for periods of from 7 to 30 days.

E. Crude thyrotropic preparation was given in daily amounts containing 5 and 10 Rowlands-Parkes units to 10 thyroidectomized animals for periods of from 8 to 24 days.

F The specific metabolic principle, which is a fraction of a thyrotropic preparation and which failed to produce thyroid hyperplain was administered in daily amounts of a cubic centimeter (later raised to a cubic centimeters) to 4 the rodectomized animals for periods of 6 to 8 days.

Most of the animals were killed by ether. As a control procedure, a few animals were killed by elthal does of pentoberital sodium. Arillary cervical periureteral, orbital and testroular fair and temporal, cardiae, and extraocular muscles were removed and fixed in 10 per cent solution of formalin. The entire orbital contents were discreted from the bony orbit as a single unit. This mass of tissue was fixed and sections were made through the entire substance just posterior to the globe so that a cross section of all retrobulbar tissues was obtained. Sections were made of the liver kidney spileen and representative lymph.

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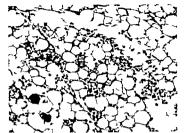


Fig 2. Changes induced in the testicular fat tab of a thyroidectomized guirea pig by 0.5 cubic centimeters of antuitrin T daily for 3 days (hematoxylin and cosin ×118)



Fig. 5. Changes induced in the testscular fat tab of a thyroidectomized guines pig by 0.5 cubic centimeters of antuitrin T daily for 13 days (bematoxylin and cosin × 118).

nodes. In some animals sections of the ureter and of the small intestine were prepared

Two techniques for histologic preparation were employed. Frozen sections were cut and stained with scarlet red and counterstained with hema toxylin. Paraffin sections were stained with the routine hematoxylin and cosin stains. In in stainces in which connective tissue changes were observed. Mallor, Heidenhain and van Gieson stains were applied. In some instances mucicar mine stains were used.

At the time of thyroidectomy and orchectomy biopsies were taken of cervical and testicular fat. These tissues were subsequently contrasted with those obtained from the same animals after thyrotropic hormone had been given to them

The changes in each tissue were studied and recorded by grading the degree of change on the basis of 1 to 4 (1 being the smallest discernible change and 4 being the most striking degree of change)

A Gross changes induced in tissues by thyrotropic hormone preparations. Antultrin T produced the most striking gross changes in animals regardless of the presence or absence of the thy roid. Fat from most of the fat depots had a redder appearance and possessed a more firm and rubbery consistency than did fat of normal animals. This gross change was most striking in the first few days of administration of antultrin T After longer periods the fat depots were extremely depleted of fat and, in the place of the fat there was found a translucent gelatinous material (Fig. 1). The most striking changes in fat occurred in animals which had lost the most

weight. Although some of the animals treated with antuitin T had lost considerable weight in many cases the volume of the gelatinous fat depots was not materially decreased. This was in contrast to the markedly decreased volume of the fat depots of the fasted control animals which had lost comparable amounts of weight. In the fasted guinea pigs which had lost considerable weight and possessed depleted fat depots, the fat remained soft and showed little if any of the gelatinous character. The fat in animals which were given the preparations, other than antuitin T did not differ grossly, from the normal

In animals which had received antutrin T for only a few days the skeletal muscles were rather pale and had a tendency to tear easily when stretched The livers of such animals were extremely pale alightly enlarged and very frable But after more prolonged administration of antuitrin T the skeletal muscles and liver returned to a more normal color and consistency Color changes similar to those in the liver were induced in the kidneys.

In the animals given antuitrin T the connective tissue septa of the harderian glands were edema tous and appeared as dark partitions between the lobules, much m contrast to these septa in normal glands.

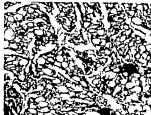
In the animals which received the crude thyrotropic preparation the connective tissue sepin of the harderian glands were less edematous than those in animals receiving antiutini T. In certain of this group which gained less weight the livers were rather pale and mottled and the fat depots were abundant occasionally more glossy and edematous than normal.



Fig. 4. a, left, Axillary fat of normal guinea pig. b, Changes induced i the axillary fat of a thyroidectomized

The tissues of the animals which received the solvent for antuitrin T and of those which received the so called purified thyrotropic factor or the specific metabolic principle did not show any of these gross changes such as occurred in the animals receiving antuitrin T or the crude thyrotropic preparation

B Microscopic changes induced in tissues of animals receiving anisativin T. The most consistent change observed in the tissues of animals receiving antiurin T was the appearance of large numbers of mononuclear and polymorphonuclear leucocytes containing fat droplets a condition not ordinarily seem in such cells of control animals. This cellular reaction was accompanied by varying degrees of edema. These fat-containing cells occurred not only in the orbital tissue but throughout the connective tissue generally. Fat tissues throughout the body were markedly



uinea pag by 0.5 cubic centimeter of antuitrin T daily or 3 days (hematoxyli and cost × 18)

altered (Figs. 2 3 4, and 5) The thin septa of connective tissue fibers between the fat cells were three to four times their normal thickness. Clusters of large and small motonuclear and polymorphonuclear leucocytes had infiltrated into these thickness expias. In some areas where the reaction was extreme, a homogeneous, faintly staining material had formed within these con nective tissue spaces to such an extent that the fat cells appeared to be floating in a matrix (Figs. 2 and 4). This cellular reaction resembled very closely the hutlogic pattern of the reparative processes seen in fat necrosis accompanying traumatized tissue.

In animals given antuitin T for short periods, there were more polymorphonuclear cells con taining more fat disoplets and there was more edema but only slight proliferation of connective tissue. In animals given this preparation for



Fig 5 a, left, Orbital f t of normal guines pig b, Changes induced i the orbital fat of thyroidectomized



guinea pig by 0.5 cubic centimeter of antuitri T dall for 9 days (bematoxylin and cosi × 8)



Fig 6 Fat laden skeletal (temporal) muscle fibers of an intact guinea pg that had received 0.5 cubic centimeter of antimetin T daily for 2 days (scarlet red and alum hema toxylin ×56)

longer periods, there were fewer polymorphonu dear cells more lymphocytes, more large macrophages and fibroblasts and more collagenous connective tissue but less edema

In sections of the cardiac and skeletal muscles of injected animals there was but little cellular infiltration although there was more than in sections of normal muscle. In preparations stained with hematoxylin and eosin a mild degenerative process of muscle fibers characterized by a loss of atriations and a granular appearance of the fibers, was evident. This occurred in a spotty manner without apparent relation to the blood supply or to any other recognized anatomic feature.

These changes in muscle took on added sig nificance when fat stains were applied to these same muscles for it was found that the fibers, in the same spotty fashion were loaded with tiny droplets of fat (Fig 6) In some sections of a single fiber the fat was in great abundance while in other places along the same fiber relatively little change from the normal was found. The degree of change in various muscles in the same animal showed considerable variation. The extra ocular muscles when studied in this way were almost always found to contain more fat than any other muscles. At times the lymphocytes and the large macrophages were more abundant about those portions of the muscle containing the most fat however in other instances the most affected muscles contained no new cellular elements. These macrophages and lymphocytes were always most abundant in connective tissue border ing muscle fibers or in perivascular locations



Fig. 7. a, left, Normal harderian gland (×35) b, Marked edema of the connective tissue around and within the harderian gland of a thyroidectomized guinea pig in which exophthalmos had been induced by administration of antitrin T (×35)

The same general trend of the reaction that was observed in connective tissue and fat namely less fat in tissue macrophages as treatment continued, occurred also in muscle tissue. Animals treated for a short time contained much more fat in the muscle fibers than those treated for longer periods. A very close correlation was noted be tween the presence of fat in the muscle fibers and the degree of myasthenia produced by antuitrin T. This correlation held true even in the animals.



I sg. 8. Edema in skeletal (temporal) muscle following the administration fo op cubic continuers of annitrin T dally for 13 days to a thyrodectomized gu nea pix (hema tory)\* and covin X140). This is an example of a striking degree of edema in muscle. There was rather high grade edema of connective tissue (see Figs. 9 and 4) through out the body of this animal as well as marked exophthal most. The temporal muscle was chosen because by its position edema is least likely to develop on the had of dependency.

treated for longer periods when fat in muscle was rarely found and myasthenia was infrequently observed.

The large, pale, friable livers observed in the animals receiving antuitrin T for a short time contained relatively large amounts of fat but the livers of those animals given the preparation for longer periods contained less fat. In those animals in which the kidney was studied the droplets of fat were present in cells of the tubular epithelium. However here again the amount of fat present was readily correlated with the duration of the injections and corresponded well with the presence of fat in muscle and in liver Fat droplets were seen too in the large reticuloendothelial cells of the lung in the spleen and in lymph nodes of animals which possessed pronounced changes in fat elsewhere in the body. Likewise the epithelml cells of the ileum and bronchs contained tiny droplets of fat in their cytoplasm. Excessive quantities of fat were found in the lacteals of the small intestine.

Edems in the orbit was most easily recognized in the septa of the harderian glands (Fig. 7). It was present, too in the connective tissue of the fat in the orbit (Fig. 5) and in other fat depots of the body (Fig. 3). In a few animals which had had striking exophthalmos, extensive edema had developed in the temporal muscle (Fig. 8). In many animals edema was either present in small

amounts or absent entirely from these muscles. The infiltration of a homogeneous, faintly staming intercellular substance in connective tissue especially in adipose tissue, appeared unite consistently not only in the orbit but elsewhere in the body (Figs. 2 3 4, and 5) Muckar mine stams did not reveal the presence of mucin but van Greson and Mallory Heidenham tech niques indicated that this material was probably collagen of young connective tissue. This homogeneous material was associated with the cellular reaction described previously and was usually most prevalent after a period of treatment when the acute phase of the cellular reaction was subsiding. The effect of antuitrin T on the tissues of intact animals is the same as seen in thyroidectomized animals when one considers equal periods of treatment. The general impression was that the edema that developed in normal animals was somewhat less than that in thyroklectomized anunals.

The tissues of the group of animals which received the solvent for antuitrin T did not sustain these histologic changes. This, therefore would seem to eliminate the possibility that the solvent or preservative was the causative factor in producing the tissue changes. Exophthalmos, it will be recalled did not develop in this group of animals.

Because the most striking changes in fat or curred during the early administration of an tuitin T and because it was during this period that the animals lost the most weight it seemed advisable to know whether phagocytosis of fat occurred in animals which lost weight rapidly for other reasons, for example, fasting. It is known that feating is accompanied by a rapid mobilize tion of fat from depots and that this fat is subsequently found in abundance in the liver.

In the fat depots of fasted animals, in which the fat was extremely depleted nuclei of fat cells per sisted and there was a relative increase of connective tissue with few lymphocytes, macrophages, and polymorphonuclear leucocytes. Fat droplets were occasionally seen in these cells but in neg ligible amounts when the fasted animals were compared with animals which had received antutrin T in no instance was this finding more than minimal in the fat depots of fasted animals.

The presence of fat in muscles was also found in fat-stained preparations from fasted animals but to a very mild degree. There was also a slight amount of edema in the connective tissue of some of the fasted animals.

It has been shown by the author in experiments described elsewhere (ro) that thyroidectomy alone was not followed by any appreciable in crease of cellular elements or edema in connective tissue

C Microscopic changes induced in the tissues by other thyrotropic preparations. The purified thyrotropic factor in the amounts administered, re sulted in the appearance of some fat in the liver but no increase of cellular elements in connective tissue was recognized and phagocytods of fat by such cells was not graded more than I In the hematoxylm and eosin preparations there was some evidence of an increase of the number of macrophages but the deposition of new connective tissue was not demonstrable. Muscle degenera tion however occurred to an appreciable degree (grade 3) in only one animal, which was an exception and in which some exophthalmos bad developed. Edema in all tissues including the orbit was more noticeable than in thyroidectomized controls, and a very slight increase in connective turne had been induced.

Generally speaking the tissue reaction in the animals given the crude thyrotropic preparation in the amounts indicated was less pronounced than that found in animals given antuitin T However it was more marked than the equivocal

changes induced by the so called purified thyro-tropic preparation The degree of edema in these DOBANZ animals resembled that of animals treated with antuitrin T and occurred throughout all the connective tissues examined There was an abnormal increase of the number of tissue macrophages but polymorphonuclear cells were rarely seen. The presence of fat droplets in tissue mac rophages, however was considerably less than in animals given antuitfin T In only about a half of the animals such intracellular fat was not demonstrable however it was relatively marked in a few animals which had gained less weight. The appearance of fat droplets in muscle fibers was moderate in most animals. It was not demonstrable at all in one animal which was not conspicuously different in other respects. The abnormal presence of fat in other organs was vanable and the homogeneous faint staining material was not found in these animals

In animals which received the crude thyrotropic preparation in the amounts indicated less striking exophthalmos developed than in animals treated with antuitrin T Edema of connective tissue was a prominent feature but the cellular reaction associated with the abnormal presence of fat in many locations and the deposition of con nective these was not as striking. The shortest period of observation of the animals was 8 days and on the average these animals were observed longer than were those given antuitin T. The experience with antiutrin T has shown that the acute phase of the reaction occurred early in the course of administration of thyrotropic hormone. The presence of moderate numbers of mononu chear cells in the tissue of animals treated for longer periods with the crude thyrotropic preparation may bear witness to a more acute re-

The traces of the animals which had received action that had preceded the specific metabolic principle in the amounts indicated were of interest because in most instances they appeared to be unchanged One animal which had lost some weight because of apparent toxicity of the product had a grade 3 edema in the orbit but this was not found in other tissues, and the animal had not become exophthal mic. In some animals very small amounts of fat were demonstrated in muscle fibers

This report is specifically concerned with certain changes which were observed in the orbit and in various other regions and organs of guines page and which ensued on the administration of antutrin T for varying periods. In addition, it

comparable animals on the administration of certain other preparations including the solvent for antuitrin T a crude, and a so called purified thyrotropic preparation the potencies of which had been assayed in terms of units not comparable to those of antuitrin T Since antuitrin T was assayed on the basis of one type of unit and the crude and purified preparations were assayed on the basis of another type of unit, it is not possible to compare the effectiveness of these preparations with that of antuitrin T on the basis of unit It is however, possible to relate the exophthalmos to the tissue changes in any one animal or in any group of animals, irrespective of the preparation which produced the changes

As hitherto shown (21) antuirin T produced marked exophthalmos. The crude thyrotropic preparation in the amounts administered was less effective and the purified thyrotropic prepara tion in the amounts given was least effective of all in producing exophthalmos. The degree of cellular reaction the edema and the connective tissue changes which occurred in these three groups of animals were most marked in those receiving antuitrin T less so in those receiving the crude preparation and least so in those receiving the so called purified product.

This study has shown that a general systemic alteration in fat depots occurred in animals which anciscon in las octores occurses in annuals which received antuitrin T These depots were rapidly depleted of their fat contents, which were replaced by a more translucent gelatinous material. These changes were associated with the infiltration of large numbers of polymorphonuclear leucocytes large numbers of polynauphonuciear redocytes and tissue macrophages which were loaded with tiny fat droplets. The impression was gained that these large macrophages had phagocytosed fat and were transforming into fibroblasts still con taining fat, and ultimately gave rise to connective tissue fibers Much edema was associated with this reaction Further evidence of the changes in the fat of the bod) was shown by the appearance of large amounts of fat in the liver kinney and skeletal and cardiac muscle and in the epithern of bronchus, ureter, and the ileum

It is probably of considerable clinical in that a relationship was recognized between appearance of fat in the skeletal muscles z.r. profound myasthenia that developed in z mag protound after antultrin T was given. cellular reactions as well as exophilater of curred in animals regardless of the present absence of the thyroid or the term ansence of the specific of animals in which there was the appearance of animais in abnormal quantities in the foregard droplets of fat were also observed in the reticuloendothelial cells of the lungs, lymph nodes, and spleen. It would seem that the appearance of fat in these specialized cells constitutes a part of the same generalized systemic reaction throughout the body. The results of these experiments sug gest that there is a generalized afteration of fat metabolism and that the connective tissue reaction and the exophthalmos may be associated

with it. These observations confirm the opinion of Smelser (45) that tissue reactions may occur in other locations than the orbit. The degeneration of skeletal muscle fibers, illustrated with the hematoxylin and eosin preparations described by Paulson (37) was apparently due to the presence of fat in these muscle fibers. Whether the lymphocytes and macrophages in muscle described by him as well as others are present to remove the fat or to carry away products of cellular de-

generation is unknown.

The demonstration of these cytologic changes in tissues, resulting in the ultimate deposition of connective tusue in the involved regions, supports the opinion of Friedgood (24 26) and Aird (1 2) that exophthalmos, after being maintained for a period, becomes irreversible. This also supports the observation of Smelser (47) that there is an increase of the residue which remains after the extraction of water and fat from orbital tissues of animals treated with thyrotropic hormone.

It is well known that pituitary extracts cause an increase of liver fat (3 7 10,30) Barrett, Best, and Ridout (s) showed by labeling fat molecules that fat was transferred from the various denots to the liver But the possible relation of this observation on the liver to conditions which incite exophthalmos has not been suggested

Several terms have been given to unlaolated substances in the anterior pituitary which in fluence the mobilization of fat, but their chemical relationship or similarity to the substances which stimulate the thyroid gland is uncertain.

The fact that fasted animals show some of these tissue changes, especially those relating to fat metabolism, confuses somewhat an inter pretation of the mechanism of such reactions to antuitrin T The changes produced by the hor mone are not identical with those induced by fasting Furthermore, they are far more extreme than those seen in the fat depots of fasting animals. It has been pointed out (21) that thyrotropic hormone had toxic effects on animals even before the thyroid response was fully elicited. It is known that animals, when given thyrotropic bormone do not withstand surgical procedures well (14) In a similar manner fasting animals (40) or animals recovering from surgical procedures (21) do not well withstand the administration of thyrotropic hormone.

The observations of increased fat in the enithelium and lacteals of the small bowel of these animals receiving antuitrin T may have some relation to the observation of Rony and his associates, who found an increase of fat in the lacteals of fasted animals. In a similar way the observation by Binet and his associates of fat globules in the bronchial epithelium and round cells of the lung in fasting animals is recalled by these observations, which show the presence of fat in the bronchial epithelium of animals receiving thyrotropic hormone.

It is quite possible that there may be some relationship between the myasthenia produced in these animals and the myasthenia in exophthalmic goiter Plummer and Wilder found a positive correlation between the loss of quadriceps strength and the exophthalmos in exophthalmic golter. These systemic changes may in some way be related to the exophthalmos and to the myasthen is produced in animals by administration of antwittin T

#### SUMMARY

Tissues of animals which during life had been given various thyrotropic bormone preparations and on which very accurate records of the development of exophthalmos had been made were studied grossly and by several histologic tech nimes.

Antuitrin T which produced the most striking exophthalmos was found to produce gross and microscopic changes in connective tierne not only in the orbit but elsewhere in the body

The study showed that as a result of the administration of thyrotropic hormone there was a generalized alteration in fat depots, which are rapidly depleted of their fat contents and are replaced by a more translucent gelatinous ma terial. Histologically these changes in fat and connective tissue are characterized by the presence of edema and the infiltration of large numbers of polymorphonuclear leucocytes, lymphocytes, and tissue macrophages. Early in the reaction the polymorphonuclear leucocytes and tissue macrophages are loaded with tiny droplets of fat. Later an increase of new connective tissue is evident. This reaction was correlated with the exophthalmos which had previously developed in these animals.

Skeletal and cardiac muscle fibers during the early period of administration of thyrotropic

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hormone lost their structions and were found to contain multitudes of they fat droplets which lined up in a pattern representing the crossstrictions of the fibers. New cellular elements were present among muscle fibers Considerable significance was attributed to a close correlation between the presence of fat in the muscles and the myasthenia present in these animals before death

a fact which may have clinical correlations Further evidence of alterations in fat during the early administration of thyrotropic hormone is the presence of large amounts of fat in the liver kidneys and epithelium from several locations, as well as large phagocytic cells of the lungs spleen

These changes took place regardless of the and lymph nodes presence or absence of the thyrold

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- REFERENCES
- I AMD R B Arch Ophth, 1940, n.s. 24 1167 1178.
- Arch. Res. Physiol., 1930, 237 515 510 March. 1936, 50 7176.

  5. BARRETT, H. Mr., Best C. H., and RIBOUT JESSE.

  6. Best C. H., and Carpell, James. J. Physiol., 1938, 1

- 1036, 80 190-103.
  7 BMJ, 1935, 92 110
  8 BHILHOURY L.W. O'DOROVAN D. K., and COLLID
  1 B EACH VENEY, 1528, and PARROT J. L.
  9. BCC LLOW VENEY, 1528, and PARROT J. L.
  9. BCC LLOW See Med. 1017 124 443-444.
- 9. BIDERT LEON VERBER, JEAN, SIMI FARRING J. C. Tend Soc biol, 1937 124 347-344 19 557-577 (D. BEADE W. R. T. Ophth. Soc. U. Kingdom (part I) II BRADE W. R. T. Ophth. Soc. U. Kingdom (part I)
- 1937 57 107 115 TURNBULL, H. M. Quart. J. Med., 12. BRAIN, W. R. and TURNBULL, H. M. Quart. J. Med., Oxf., 1938, n.s. 7 193-323.

- 13. BROCK, SAM. West. J Surg 1941 49 585 594
- Told., 1941 49 47 448.
  BURCH, F. Minnesota M., 1929, 18 668-675-14
- 15 BURCH, F. E. MIRIESBUR M., 1949, A. 2007, 10 Ibid., 1942, 93, 299-399.
  16 Hold., 1942, 98, 1999, 200.
  17 CASE W. E. Minnesota M., 1942 95, 298-299.
  18 COLLY J B Tr Congr Am. Physicians, 1939, 54
- 18. COLIF J B Tr COMP AM. PHYRICANA, 1939 54
  10. Idem. Lancet, Lond., 1939, 1 097-993.
  20. DONTHS, B M. SUIT, Gyn. Obsit, 1945 80 585-533.
  21. EMd., 1945 83 990-990.
  22. ELLET E C. TT Am. Suit, 1943 96 995-997.
  23. FRIEDOWN, H. B Bull. Johns Hopkins Hosp., 1934, 24 48-72.
- 24. PRIEDOCHI, II. B. BIII. JOHNS HOPLINS HORD, 1934, 54 48-72
  85. Idem. Tr Am. Am. Study Golter 1941 PD. 188-142
  85. Idem. J. Clin. Endoct., 1941 1, 804-818
  87. HARK, G. M. Arch. Surg. 1944, 8 214 222.
  88. JUNERARIO KARI, and SCHOULER WALTER. Klin.

  - Wachi., 1934 11 1176-1177 Chem. Abstr., 1934,
  - 85 5527 29. LAURIE, C. G. M. J. Amstralia, 1939, 21819-839
  - 99. LAMBIA, B. M., and BARKES, R. H. Proc. Soc. Exp. 90. MARKAY E. M., and BARKES, R. H. Proc. Soc. Exp. 90. MARKAY E. M. AND MARKES BIOL. 1918, 358 803-805 and NATHEBUR, H. C. Tr Am. 101. 112. MCCOOL.)

  - Biox, 15, L. and NAMESTS

    MCCOST, Soc. 1033, 30 10 Ophth.
    Ophth. Soc. 1033, 30 10 Ophth.
    1044, 27 093, 713

    MUNTANY J. H. C. West, J Surg. 1034, 40 530-54333. NATTRIKES, H. C. West, J Surg. 1034, Ph. 150-54334. Idem. Tr. Am. Am. Study Golder, 1039, Ph. 150-54314 Idem. Tr. Am. Law. Study Golder, 1039, Ph. 150-54314 Idem. Tr. Am. Am. Study Golder, 1039, Ph. 150-54315 Idem. Tr. Am. Surg.

  - 34 Idem. Tr Am. Am. Study Gotter 1933 pp. 189-892. 35 Idem. Arch Ophth. 1933 n.s. 9 : 11. 36 Idem. Am. Surg. 1938, 108 599-84. Tr Am. Surg. Ams. 1938, 56 49-88. 37 PAULSON D L. Proc. Soc. Exp. Blol., 1937 36

  - 38. Idem. Proc. Staff Meet. Mayo Clin., 1939, 14 818-
    - 39. Idem. Tr. Am. Ass. Study Golter 1946, Pp. 309-310
      39. Idem. Tr. Am. Ass. Study Golter 1946, Pp. 309-310
      A. PLIMMER, W. A., and WILDER, R. M. Tr. Am. Arad.
      - Ophth., 1934, pp. 41-54. Royr H. R., MORTHER, B and Ivy A. C. J Biol.
      - Chem, 1033, 101 101 170.

        Chem, 1033, 101 101 170.

        ROWLANDS, I. W., and PAREES, A. S. Blochem, J.,
      - 42 ROWLARDS, 1 17-2 and 1 accept, n. o. DIOCHEM, J., 1934, 28 1839-1845.

        43. SMELECE, G K. Proc. Soc. Esp. Blol., 1936, 35
      - 43. SMELTON, G A. FIUE SOC. EMP. HIGH, 1930, 35
        148-130.

        149-140.

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# EDITORIAL

# SURGERY

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MAY 1946

### THE USE OF COMPRESSION IN THE TREATMENT OF INJURIES

THE use of compression to arrest and prevent escape of blood and serum into body tissues represents a surgical principle which, to use Homans words, has been 'perennially discovered discredited forgotten, rediscovered and reaffirmed

The subcutaneous rupture of blood vessels and the rapid escape of blood and serum into soft tissues are of frequent and everyday occurrence The blow over the eye or fore head, the crushing of a finger tip the twist of an ankle—all lead to rapidly forming swelling and the subsequent discoloration that in dicate blood vessels have been torn and blood has infiltrated the surrounding tissues. Severe contusions and crushing injuries of soft tissue and bone are followed by the same train of events in a more exaggerated form

When one is confronted with an open wound from which active bleeding is taking

place one a first instinct—whether layman or surgeon-is to apply pressure to stop the bleeding The surgeon in the operating room almost dally instinctively and logically presses gauze sponges or 'laparotomy pada'' against a bleeding surface to arrest coming The same principle can be employed, and with almost equal effectiveness in the control of bleeding which does not meet the eye as a rapidly welling pool of blood but which is accumulating under the surface in direct ratio to the extent of injury and the elasticity of the overlying tissues.

When one recalls what happens when a considerable quantity of blood infiltrates soft tissues-the harmful compression of fragile living cells the slow disintegration of red cells the fibrosis that follows the absorption of serum and disintegrated corpuscies—it be comes a matter both of logical treatment and of importance to arrest such bleeding as promptly as possible. When one recalls further that after an extensive crushing injury the loss of blood into the soft tissues can be so great as to lead to shock and threaten life, the arrest of such hemorrhage becomes a matter of life and death. The most certain means at our command of controlling such bleeding is by amooth firm compression of the affected area

There is a second important group of cases in which similar conditions obtain—those in which blood without red cells escapes rapidly into the surrounding tissues and leads to the same local and general symptoms of swelling distention of tissues and fluid loss. Whatever the cause of the fluid loss that rapidly follows exposure to extremes of heat and cold-in creased permeability of damaged capillaries,

EDITORIAL 619

local vasodilator reaction which causes the region (surrounding a burn) to become an open abunt with capacity to contain a maximal amount of intravascular blood 1 or whether still other factors at work-every worker interested in the treatment of burns or of injuries due to freezing has been con cerned with the rapid loss of fluid into the tissues and with the serious effect of such loss both on the tissues at the site of injury and on the entire body mechanism. With the con centrated attention that has been given to these injuries in recent years it has become increasingly apparent that the prompt application of pressure over the injured area is the most certain and effective means of preventing and checking fluid loss and of arresting the 'white hemorrhage which is so important a factor in the clinical picture that develops rapidly after severe injuries due to extreme heat and cold.

A third group of cases in which the use of compression is an important factor in bringing about recovery is well illustrated by a simple case report from Sampson Gamgee's Surgical Lectures published in 1883.

On the 18th September 1879 a bloated middleaged man came before me in the out patient room with his right leg big tense purple, and exquisitely tender

"The man had earned his living as a hawker and had been a hard drinker On admission the right leg was of greatly increased size, and of deep purple colour the skin tense and shining and intensely sensitive to the alightest touch. Circular measure ment of the two legs gave the following result

At the middle of the patella 18% inches 17 forches Six inches below 18 faches 7 inches Round the malleoil 14 inches 1 18 inches

Placing the man on his back and raising the foot I enveloped the limb in a layer of cotton wool, over which I constructed a compressing millboard and bandage latticework.

"September 19th, 9 a.m.—After the lapse of 13 hours bandages very loose from the considerable

subaidence of swelling which has taken place in the twelve hours since they were applied. I applied another bandage with firmer pressure and suspended the limb. The patient had passed a comfortable night, with the exception of some pain between midnight and 5 a.m. He is now perfectly comfortable.

8 15 p.m.—Has been very easy all day On removing the apparatus the limb is much paler and softer and scarcely tender on pressure. The patients spontaneous expression is It is wonderful how I can bear it handled now and I could not stand a feather touching it last night. The following are the circular measurements of the right leg:

And patella 17 inches 134 inches Skr inches below 1514 inches 134 inches Round the maileoli. 13 inches 2 inches 2 inches

The strips of pasteboard were now re moistened, to fit the shrunken limb and bandaged to it, latticework fashion, over cotton wool with increased pressure. The application last night though conducted most gently caused occasional exclamations of intense suffering but the patient bere it tonight, though executed comparatively roughly without the least pain. The same process was repeated daily to follow up the decreasing limb with equable pressure and at the end of a week, the two legs were of equal size.

Admitting the beneficial influence of the hori sontal position of the body and of the suspension of the limb in the flexed position, there can be no question that the immediate relief of pain and the rapid subsidence of swelling were chiefly due to smooth elastic pressure"

Gamgee cites a number of similar cases in which disabilities resulting from widespread exudation through the soft tissues associated with a chronic inflammatory process responded rapidly to the application of compression and immobilizing splints. Further more he points out that many English French, and German writers during the century preceding had repeatedly emphasized the importance of compression in the treat ment of injuries and of chronic inflammation -a method "forgotten rediscovered and reaffirmed Ironically perhaps, Gamgee obtained such good results by adhering to sound surgical principles that he was reluctant to accept the teachings of his friend and classmate Lister

It seems almost superfluous to repeat in a surgical journal Blair's emphasis on "The

Glena, Wrs. W L., Gilbert, Helen H., and Drinker Ceell K. J Cha. Israel., 1941, 73 600.

"Campes, Sampson. On the Treatment of Wounds and Fractures. vid at. London. J & A. Churchill, 1853.

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Influence of Mechanical Pressure on Wound EDITORIAL Healing' 1 but a few lines deserve repetition

because so much of good surgical sense is Limitation of the amount of plantic material compressed in them that pours into the wound."

There are chiefly four basic things to be gained A there are concenty four means tunings to be gained by the use of properly applied mechanical pressure Fowler of the University of Minnesota sai. at a recent meeting in Minneapolus that as The elimination of dead spaces "The control of coxing. understanding and appreciation of the value of compression was one of the outstanding

SUMMER L. KOCH.

... Inc control of cosing.

The limitation of venous and lymph stasis. Blatt V. P. The infrarect of mechanical pressure on wound healing. Illinois M. J. 924, 46 249-25 leasons learned during the war Perhaps it has been so well learned that it will not again have to be rediscovered and reaffirmed

#### BOOKS RECEIVED

Books received are acknowledged in this department. and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender Selections will be made for review in the interests of our readers and as space

permits.

HOSPITAL CARE OF THE SURGICAL PARIENT. A SUR GEOR'S HANDBOOK WITH AN APPENDIX ON THE TREAT MERT OF WOUNDS. By George Crile, Jr., M.D. and Franklin L. Shively Jr., M.D. Foreword by Evarts A. Graham, M.D. Springfield, Illinois Charles C. Thomas,

AN INTRODUCTION TO ESSENTIAL HYPERTENSION BY Richard F Herndon, M.D., F.A.C.P Soringfield, Illinois

Charles C Thomas, 1046.

AWATOMY OF THE HEAD AND NECK. By R. T. Hill, Ph.D.

Philadelphia Lea & Febiger 1946

BURNA SURGEON RETURNS. By Gordon S. Senerave. M.D., Maps by Phoa Lieng Sing and Lucas Manditch. New York W W Norton & Co. Inc., 1946.

DIOTTALIS AND OTHER CARDIOTONIC DRUGS. By Eli Rodin Movitt, M.D. New York Oxford University Press,

MODERN ANAERHEID PRACTICE. Edited by The late Sir Humphry Rolleston, BT, GCVO, K.C.B., M.D., FR.C.P., and Alan Moncrieff M.D. FR.C.P. ed ed. Published on behalf of The Practitioner London Eyre and Spottlawoode (Publishers) Ltd., 1946

NURSED OF AND NURSENG EDUCATION By Agnes Gelinas, R.N. A.M. New York The Commonwealth Fund, 1946. MEDICINE IN LEDUSTRY By Bernhard J Stern Ph.D

New York The Commonwealth Fund, 1946 NURSING IN COMMERCE AND INDUSTRY By Bethel J

McGrath, R.N. New York The Commonwealth Fund,

APPECCIONES VASCULARES QUIRUROTCAL DEL ENCEPALO Anticount Vacculates (official but is accepted by Alfonso Asenjo, F.R.S., F.A.C.S., and Enrique Ulberall. Santiago Central de Publicaciones, 1945
NEUROSYPHIER. By H. Houston Merritt, A.B. M.A.

(Hon.) M.D., Raymond D Adams, M.A., M.D., and

Harry C. Solomon, B.S., M.D. New York Oxford Uni

versity Press, 1946
NOTABLE NAMES IN MEDICIDIE AND SURGERY By Ham
fiton Balley F.R.C.S. (Eng.) F.L.C.S., and W. J. Bishop
F.L.A. London H. K. Lewis & Co. Ltd. 1946

JOURNAL OF THE HISTORY OF MEDICINE AND ALLIED Sciences. Vol. 1 No 1 New York Henry Schuman,

PERICULIN THERAPY AND CONTROL IN 21 ARMY GROUP Published under the direction of the Director of Medical Services, 21 Army Group with introduction by the Consulting Surgeon. 1945.

HIPPOCRATIC WINDOW FOR HIM WHO WHERES TO PURSUE PROPERLY THE SCIENCE OF MEDICINE. By William F. Petersen, M D Springfield, Illinois Charles C Thomas,

1046. APPLIED PHYSIOLOGY By Samson Wright, M.D. F.R.C.P. London, New York, Toronto Humphrey Mil-

ford, Oxford University Press, 1945

KETTLE'S PARIOLOGY OF TUNOURS. By W. G. Barnard, F.R.C.P., and A.H.T. Robb-Smith, M.A. (Oxon.) M.D. (Loud.) 3 ed. New York Paul B. Hocher Inc., 1946 SESIONES OCIRURATICS PARA GRADUADOS, HOSTITAL

RAWSON By Ricardo Finochietto Lecciones de ciruria. First and Second Series. Buenos Aires La Prensa Medica Argentina, 1945

HIPPERTEROIDEMO FISIOPATOLOGIA Y TRATAMENTO, BY Jose Alberto Caeiro Buenos Aires Lopes & Etchegoyen 5.R.L. 1945.

PAGINAS DE CIRUGIA. By Enrique Finochietto. Buenos Aires La Prensa Medica Argentina, 1945.

ORAL MEDICINE DIADOGIS—TRANKET. By Lester W Burket, D D.S., M.D. With a Section on Oral Aspects of Aviation Medicine by Major Airin Goldhash, D.D.S. M.S., D.S. A.U.S. Philadelphia, London, Montreal J B. Lippincott Co. 1046.

AMBULATORY PROCTOLOGY By Alfred J Cantor M.D. With a foreword by Beaumont S. Cornell, M D. New York

and London Paul B Hoeber Inc., 1046

### CLINICAL CONGRESS OF AMERICAN COLLEGE OF SURGEONS

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## PLANS DEVELOP FOR 1946 CLINICAL CONGRESS OF THE AMERICAN COLLEGE OF SURGEONS

THE announcement in the March issue of SURGERY, GWNEDLOGY AND OBSTITEZES of the definite plans for holding the 1046 Clinical Congress of the American College of Surgeons at the Waldorf Astoria in New York City from September 9 to 13 has been greeted with enthulasm. A large meeting and exception ally keen interest are assured. The four years without a Clinical Congress have been years impressively lacking in a focal point for intensive study of trends in surgery, and surgeons every where are eagerly anticipating the resumption of the annual meeting

Progress does not stop when there is no Congress, of course, but the application of new techniques and ideas is delayed when there are no opportunities for the meeting of minds that a large international conference affords. The Clinical Congress makes a convenient annual miliepost by which to calculate and to evaluate advances in surgery and it provides a spur to progress through this function and through its inspirational infinite.

Surpeous need the stimulation that comes from directly hearing of new developments from the lips of those who helped to initiate them. They need opportunities to ask questions, to participate in discussions, and to observe other surgeons at work, both in the local hospitals and on the motion picture screen. The latter teaching device in particular is becoming increasingly profitable and popular as more good medical films are produced and at the Cinical Congress ample opportunity is provided for surgeons to view the newest and best pictures.

The Clinical Congress, as the previous article indicated, will be the usual five-day session, embracing forums on fundamental surgical problems panel discussions, clinical conferences, symposis, demonstrations, films scientific sessions, hospital conferences, exhibits, and the formal Presidential Meeting and Convocation. This year the Convocation will be a particularly momentous event, since in addition to the initiates of the current year there will be present a great many of the accumulated total of a 7,44 surgeous who were recived into fellowship in absentia during the four war years in which no Congress was held. It will also be an occasion of reunion for the Fellows, both new and old, many of whom have been over seas on military duty much of the time since the Boston Congress in 10.11.

The new officers of the College who will be in stalled at the Presidential Meeting and Convocation are Dr. Irvin Abello Louiville, as President Dr. Leland S. McKlitrick of Boston, as First Vice President and Dr. F. Philairy Collions of Atlanta as Second Vice President. The Presidential Address will be given by Dr. W. Edward Gallie of Toronto the returng president.

Plans are progressing for making the programs of all of the scientific sessions, morning alternoon, and evening provide the most comprehensive delineation possible of advances in surgery and tated sciences during the five years succe the 1941 Congress. The various surgical specialities, ophetalinology orthoploarly properties of the pr

Advance registration and hotel reservations are urged upon all who plan to attend the Congress. May, 1946

# International Abstract of Surgery

Supplementary to Surgery, Gynecology and Obstetrics

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## INTERNATIONAL ABSTRACT OF SURGERY

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# PENETRATING CRANIAL WOUNDS A SUMMARY OF METHODS USED IN MANAGEMENT

#### Collective Review

J E. WEBSTER, M D and E. S. GURDJIAN M.D F.A C.S Detroit, Michigan

#### INTRODUCTION

ECENT literature pertaining to the management of cranial wounds in World War II has added important new information to the older concepts of treatment. The reports which are continually reaching publication serve to advance our knowledge and unify opinion. Any general review of this subject must consider the present incompleteness of information. We propose merely to aummarize the experiences of various observers to date in the interest of consolidating reports and to emphasize the application of the measures employed in war surgery to related cavillan injuries.

This summary is devoted mainly to a con skleration of penetrating wounds caused by bullet or shell fragment missiles (Fig. 1) Injuries of this class produced by forces peculiar to high velocity represent a unique neurosurgical problem Penetrating types of civilian cranial injuries of low velocity present quite different requirements in care. The difference in the decrece of destruction of scalp skull and cerebral tissue dictates the differing principles in surgical management. The radical measures employed in the débridement of high velocity wounds are not required in the less destructive, low velocity civilian injuries (hammer blackjack rocks, knives car door handles, electric fan blades stationary objects) distinction is made at the outset since only brief consideration is given to the usual low velocity type of penetrating wound as encountered in dvilian practice.

From the Department of Surgery, W yne I all ensty College of Medicine and the Department of Neurosurgery. The Detroit I'e-ceiving and Grace Hospitals, Detroit.

The survey includes observations made in 300 patients with crankal wounds produced by missiles of high velocity and treated in the 36th General Hospital which was located in Italy and in France Because of the hospitals location all types of wounds were observed including one group of 40 cases of late wound débridement in German prisoners of war (210 211 212) The civilian patients with guishot injuries of the brain were treated at the Detroit Receiving Hospital and Crace Hospital during a period of 90 years.

Before the principles followed in the care of patients with cranial wounds in World War II are described a brief review is made of the history of the care of war wounds in general and of those historical factors and opinions marking progress in the care of crantal injuries. The time periods are divided for consideration as follows Early World War I Interim and World War II periods The neurosurgical methods and technique employed in World War I are reviewed in some detail for comparative purposes. Brief consideration is given to the applicable physics of tissue destruc tion produced by high velocity injuries. A group of nonmilitary gunshot wounds of the brain was included in order to evaluate methods of treat ment used in civilian practice.

#### HISTORICAL EARLY PERIOD

#### ARLY PERIOD

It has been reported that the first use of gun powder by the English was in the Battle of Crecy in 1346 (100). The poisonous nature of the wounds so produced was described by Ciovanni da Vigo (1460-1525), surgeon to Pope Julius II

who stated that all gunshot wounds are not only who stated that an guiname would are not con-confined and burned (requiring mont sppice continuo and outness trequiring moss arrange tions) but also poisoned by the powder (requiring account of the powder (requirement of the p dentation); and hence difficult to cure" (120) "He advised contenting the wounds by means of boiling elder oil or actual cautery " Braums II eig possing enter on or action causes)

a surgeon of Strasbourg and others agreed with
this plan during the 15th century (86) A new era was thus begun in warfare attended with "super stitions terror aroused by the use of the new seapons which produced remarkable noise and Response name products remaind the same and fine upon discharge and profound acute and late. effects upon human tissue. In the attempt to re lieve the bod) from the process of poisoning the openings of entrance and exit and track of the openings or critically and can and can are the ball were incised the wound dilated by fents or other means, terebuthinates or boiling oil poured into it irritating compounds and oint ments applied and it was only after the wound ments appared and at how only acted the revolution and considered to be fully purged of its remoin and foul humor by the extensive suppurative action thus kept up that electrization was permitted to be established" (95)

The 16th century marked the beginning of a revolutionizing treatment of war wounds in Scheral Alphonse Stenza surgeon to Paul III from 1534 to 1549, in the early part of his career held the same viers as Weig and Vigo as to the pousonous nature of gunshot wounds. He made important improvements in wound management, advising upon the search for balls, their extrac tion, and upon the subject of dresungs (80) Later in this era Ambrose Paré (144) leading suggests of the Renaisance and founder of military as a science and art," discontinued the early practices, merely dresung of Itah supported the doctrines of Park which were published in a treatise on gunshot wounds (80) Leone Botal, and Fallophus "at once embraced the views of these eminent matters and Felix Wurz of Germany about 1576 wrote against the employment of too complicated instruments for the extraction of balls deprecated trephning for depressed gunabot fractures of the skull ad ised the discontinuance of the application of fatti subriances to gunshot wounds and musted upon the antiphlogratic treatment (80). In this century Botallus (17) described foreign bodies in the brain reognized but was not drained even though it Complicating cerebral abscess was mas recognized that death would result by ea pectant treatment Opinion was confused as to the window of removing bone fragments from fractured skulls it was believed whe to bore if fisture in the skull was present. Dyes were used

al) to detect the discontinuities of the skull, a pact the employed in the hippocratic case (1 s) A return on Gentle on Gentle of the hippocratic case (1 s) A return on military and was the first plant belief of the hippocratic case on military and was the first plant belief of the hippocratic case of the hippocratic

let collections and for subdural hematoms [135]

3 During the latter part of the 18th century

3 (1702), Ferry (149) in the Manuel de Chrispen

4 and wrote "The fast indication of some

is to change the nature fast indication of some

actify as possible into an incised one." This

treatment by incision a return older practices,

was widely used, Particularly by the French, the

reduction and prevent strangulation of

actification and prevent strangulation of

actification caused by in

[a flammation arising in the track of the projectile (5)]. The term "debridement" was used to de arise this method forward management. For a sampler and of loss french practic. For a sampler and forward interest in an out of the french practic flow a sampler and published in 1910 and entitled filled. Inflammator and Garabot Woomle. Something can be done do when the river of the property of the french of the projection of the french of the pro

ing Hester (90-128) referring to cranel wounds in the 18th century made the following observation (Guardon wounds which affect the cranism are for the most part attended which affect the cranism of the concustom of the interarble spiner very slight or the concustom of the interarble spiner very slight or the concustom of the interarble spiner very slight or concustom of the interarble spiner very slight of the concustom of the interarble spiner but the concustom of the interarble spine of the cranism of the vens and arteries born, in which case the cut are asset to be concustomated based has no vent, nor can be created the concustom of the cranism be extracted. Death therefore must be the issue unless prevented by

The Napoleonic Wars which ended in 1815 marked new Progress in the care of gundot Arice Cooper as stating that in (84) guoted Sir War between 1828-1813 that in the Penlinshir cared from the practical experience of that war form the practical experience of that war fore.

Baron Larry (117) in his memours of the Na poleonic campaign in Russia. Germany and France clearly stated the principles which he followed in the treatment of cranial wounds. He reported that m a wound of the head accompanied by a fracture of the cranium should the fragments of bone be displaced and driven internally so as to injure the bram and dura mater the trephine is indespensable. When the foreign body which has caused the wound is enclosed between the pieces of bone or has penetrated into the interior of the cranium-the case is again one which demands the application of the trephine. Finally, when the surgeon is assured of the existence of effused fluid under the cranium, this instrument is also indicated. He believed that the operation should be performed as early as possible recognizing that "inflammation is generally established in the meninges after the first twenty four hours suc ceeding the occurrence of the injury (84) held similar views, subscribing to operative treatment based upon observations made in the Peninsular War After suggesting that a cranial wound be examined with a blunt, flat probe to determine the extent of damage, he raised the question 'What is to be done when depression and breaking down of the inner table have been ascertained? There can be no heatation-that in all such cases the trephine should be applied al though no symptoms should exist, with a view to anticipating them. The old doctrine, it may be said in regard to fractures generally is revived in these cases but on a principle with which our predecessors were not sufficiently acquainted. A patient very often survives a mere depression of the skull he may and occasionally does, survive a greater depression of the inner than of the outer table but it has not been shown that he ever does survive and remain in tolerable health after a depression with fracture of the inner table when portions of it have been driven into the dura mater The result of my experience has rendered it imperative to remove at once all portions of bone or foreign substances which have materially injured the dura mater although no symptoms of compression should be observed. Hennen (92) emphasized the importance of trephine for com pression without fracture. Where there is no wound the case becomes dubious and we are reduced to act upon probability founded upon gestures of the nationt, his sensibility to pain upon pressing on a particular spot, or we may be guided by what the French surgeons place much depend ence on viz. the existence of paralysis, which is most commonly on the side of the body opposite to the compressed portion of the brain





Fig. 1 Examples of penetrating missiles removed from the brain. They bone chips and particles of clothing are present on the surfaces of the shell fragments.

The military operations in Algeria (1846) in Schleswig Holstein (1849) and in the Crimean War (1854-56) presented opportunities to test again the applicability to military practice of the great improvements accomplished in the civil practice of surgery in Europe since the termination of the war in 1815. The practice generally, of 'what has been styled conservative surgery' characterized the interlude between wars (95)

The trend toward conservatism in cranial sur gery as well as in general surgery was demon strated by the views expressed and by statistics which began making their first appearance Longmore (95) pointed out that a gunshot wound of the head had previously been an indication in itself for the use of the trephine, that earlier in the 10th century trephine was used for injuries with out fracture. Such preventive trephine has been proved to be useless as well as dangerous and is universally acknowledged not to be an admissible operation. He stated that the majority of the English surgeons after the Peninsular War limited the use of trephine to fractures with depression causing interruption of cerebral func tion, fractures with bone indriven into the cerebral tissue and where an abscess had developed and was capable of evacuation. The trend was to confine the practice of trephine 'within still narrower limits. Stromeyer (95) an experienced German surgeon reported 41 gunahot iractures of the skull with depression Of the 41 cases, 7 terminated fatally Of the 34 patients who lived, only I was trephined and this was the only case of trephining which gave a favorable re sult in all three campaigns (Schleswig Holstein 1849) Stromeyer had earlier advocated trephine but stated in his Principles of Military Surgery

that he had abandoned the Practice (183)
Macleod (122) in Anotoned the Practice (183)
in the Crimen' Aported that of patients with
the treatment of Secretarial wounds the treatment of the study wounds the treatment of the study wounds the treplane
was employed only 28 times and 24 of terplane
bised upon the models access of trepanation,
dorsement of the modern treatment of ex in
in mre cases (122)

Macleod reported that the teaching of all thoroughly to remove only such pieces of bone as could be got at with the forceps and which were could be got at with the forceps and which were locally and even generally to bleed, if need be, enjoin when there says as fear of inflammation to constitution of the second applies but, if possible to the special senses also by an and to country the property of the special senses also by an and to country the property of the special senses also by an and to country the strength of the special senses also by an and to country the property of the special senses also by an and to country the special senses also by an and to country the special senses also by an and to country the special senses also by a special senses also be a special senses also be a special senses and the special senses also be a special senses and the special senses also be a special senses and the special senses also be a special senses and the special senses also be a special senses and the special senses are special senses as the special senses are special senses are special senses as the special senses are special senses. The special senses are special sense

This extract is not only expressive of the opin on of a single individual but may be regarded as embracing the views of the majority of surgeons of this period (80).

Information resulting from the War of the Re bellion in the United States (126) raised some doubt as to the reasonableness of the conservative conclusions formed by the continental surgeons. Reports showed that successes attended surgical intervention in crantal wounds. published a comparison of the results of trephin ing compared with those of the expectant plan of treatment. Of 160 patients on whom the trephine Gross (80) was emblosed to be cent died and of 223 with kerious conditions treated by expectancy 74 per cent deel Of 126 cases in which fragments of bone were clevated or extracted, or foreign bodies mere removed 55 per cent were fatal. After all operations of every kind the rate of recovery was 41 per cent. By the conservative or espectant plan only 15 per cent lived, making in favor of operative interference 16 per cent of recoveries. Gross (80) reviewed the plan of treatment of crantal wounds proposed by Neudorfer (137) who was so prejudiced against the trephine that he not only did not use it himself but advised that it be excluded from the armamentarium of the arm) surgeon. He summanized the views of Stromeyer (183) Propost (155) Legouet (119) Williamson (217) Demme (51) and Matthew (125) In about

ing the confusion of opinion. He pointed out that the trephine is emplored by surgoon of Lnown experience and high reputation for widely different lenous and symptoms—that with one, its results have been invariably fatal and a positively contraindicated under all circum stances. With another the results have been so favorable that its application is not restricted to: navourse true to appearance to an extraction of lesions (Progot) Legocal Williamson) The variance in the experience be tween the American surgeons and those shood ras ascribed by Longmore (95) to the fact that the former did not restrict the application of the trephine to otherwise hopeless cracs and to the difference in the effect of the old round ball and the sharp mine bullet.

ion Toward the end of the 19th century advanced to Opinion formulated the following policy in the best stances are force of lower from the stances are force of lower or forces as well as the stances are force down and evidently peak stance or where the press upon—the or forces substance or where absence as manifestly exists in any stance or where absence as an interest extended by an analysis of the mana at the wound itself storded by any proper operation but all other cases harm will sorting to be considered by abstancing force in them sorting to long with the force of the word of the stances of th

Three years following the War of the Rebellion at (8807) Listers' principles of antisepsis were all (1907) and though in the Francisco Cernal (1907-71) and it (1907-71) and it

The magazine breech leader was introduced in 1892 and the use of this weapon greatly influenced in the type formula produced and the type of mound produced and the type of mound control of Spanish American (1898) sare. Used during the Wars (1890-91) this type of mile fired a corrodal of track durings (1879) wounds minimal degree were effectively treatly were sufficiently in the produced direction of the control of the cont

TABLE 1.-19TH CENTURY MORTALITY STATISTICS IN CRANIOCEREBRAL WOUNDS! (95)

Authority	Injury	Cases	Deaths	Per con
Sary Report Cl. No. 6, War Dept. Surg. Gen. Office, 1863, pg. p (War of Rrbellion, U.S.A.)	Omahot fractures and injuries of crantal house	704	\$03	71.7
T P Matthew Staff Surg. B A., Crimean War (1834-56)	Omnshot wounds of head, of which 30 were contraion, fracture, panetra- tion, or perforation	898	170	73.9
M. Chesta, Crimean Report (1854-56)	Geneliot fractures of the cranium	73	541	74
M Chesu, Austre-Franco-Italian War of #50	Wounds of head freet all causes—contract, complicated undetarmised, con- tinious, and unspecified (sans indications) injuries		498	28 2
	Complicated wounds from number balls			47.4
	Cameon balls or shell fragments	23	1	47 4
Inspector-Gen. Mount in New Zealand War (1863-65)	Scalp westeds	340	_	
	Injury of crazial boncs	1		-
	Fractures of treatum with wounds of brain			100
Macleod, statistics of Crimean War (1854-56)	Scalp wounds	630		
	Fracture of creature without known depression	6	13	37 7
	Fracture with depression	74	£3	7 6
	Penetration of skull	67	67	100
	Perforation of skull		6	65 7
	Total	851	167	
Alcack (Spale)	Fracture	ц	11	78 5
Minitre, War in India	Posetrating worsels of skull	0	7	84.4
Minière, War in India	Penetrating wounds of kull	1		000

Extracted from Holmen, System of Surgery Philadelphia; Henry C. Lea's Sonn, \$31.

can War reported that conservative surgery is the pride of the modern doctor on the field of battle. The stacks of amputated limbs that con stituted such a gruesome and constant sight after every battle during the Civil War will never be seen again on the field of battle where modern surgery is practiced. The first aid dressing properly applied at the right time constitutes in the vast majority of cases, almost sure protection against infection of the wound. Prophylaxis has largely taken the place of operative surgery in the field. Our recent expenence has demonstrated that the small-caliber rule is the most humane weapon If the wounded survive the immediate effects of the injury the prospects of recovery are good. What a contrast with the experience of the surgeons during the Civil War only thirty five years ago At this point artiller, was still little used and high explosive bombs and land mines were unborn instruments of destruction Records of the period indicated that shell frag ment wounds were invariably infected.

Prior to World War I, von Bergmann (203), Papaullon (143) and Doyot (55) recommended operative treatment for penetrating cranial wounds, employing an open method. Zoege Von Manteuffel (205) in 1906 reported upon the inadequacy of the conservative management when used in the Russo-Japanese War (1904 5). In the open treatment, after débridement of the communited bone, neither the dura nor scalp was closed which usually resulted in hemiation of the brain and frequently the death of the patient. When this treatment was used in the Bulgarian Turkish War (1972-73) by Colmers (39) 70 per cent of all tangential gunshot wounds of the head with minury of the brain died of infection

#### WORLD WAR I-GENERAL CONSIDERATIONS

Surgeons in World War I were imprepared to treat the type of wounds which they encountered because of two major changes in the instruments for wounding. The first was the increased velocity of missiles and the second was the frequent use of artillery fire in place of ride injury to the extent that the ratio of gunshot wounds to those produced by artillery fire was reversed (18)

The concept at this period of a conservative management of war wounds of all types even with the knowledge of asepsis proved to be a failure. Established methods resulted in a high incidence of morbidity and mortality due to infection (66 18) Since antiseptics were in vogue, early use was made of various solutions to cleanse the 358

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wounds, including these of the skull. There of
                                                                                                                                                                                                                                                                                        INTERNATIONAL ABSTRACT OF SURGERY
   Founds including those of the same of the form of the first to sterilize tracks without removing de final form of the first tracks of the first tr
tors to section traces without removing the state falled. Definitioned of the in
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VIALUEL CLOSUS PAINELL ACCURACIONALE OF CITE CAR FOUND BY SIMPLE DESIGNATION OF THE PROJECT AND ASSESSED OF THE PROJECT OF THE d inflammation (an old crabbased method [140]) The composition of the view and in the section of the composition of t was companyed storing with saturaptives to consolve destroyed inside and inhibit infection continued to the continued of the ing faline horever and muon meccoa commo ing faline horever analy resulted in a teching a nure conver many results in a security of excision of deviation distance in the track inque or exchange or very more unaux m ore many of the mixele either bullet or shell fragment following the contract of the co of the massic collect points of such inscident line collect by a delayed primary closure [17] This forei by a dealed primary chount [14]// Anna found to meet the requirement for anna and a state has town to meet the enquirement for some factory wound healing in soft these wounds and it instances of control of the control Cambi injunce. Early in the Par many reports statutal injuries. Said) if the fraction of the literature advocating exclusive of appeared in the measure survivating excession in the would track and removal of both fragments the round track and removal of bone inserted and foreign bodies [Roberts (161) John (1610)]. Heats and Gross (163) Heats and Gross (163) Fry and Selve (164) Fry and Selve (164) Anderson [61] and Stress and Gross (213) frey and serve (213) Anderson (2) titous and Houselfo (79) Amorison (2) and others. Some authors suggested treatment of the

Outers, Some submissing suggestion intermed to the standard form 3 to 5 that after influty Sources to the finding form of the first and form of the first acound from 2 to 5 thys after injury (wirgent and Holmes (179) Whilaker (215) Holmes (26).

Salgent (163) The old term debridence (26).

The old term debridence of winned of winned to winned. cargent (1997) the out term term universal to describe the method of wound standard developed during World Ray I R was reported that early in World War I the the man reported that early in Protein real and the control of periodic of the control of the co results of operations for penetrating wounds of the head were "Innentable" (21) The cultivation of contraine mortality varied from 50 to 65 per cent (Sathiec [13] Derache [54] Monphoft contrained of the war there was no agreement

Louri 1132/ Opics and Jaurenneery (100/)
At the outset of the war there was no agreement At the outer, or the war there was no agreement of this class of the concerning the management wounded December upon of this class of the williams where where and hop to operate the class case.

I shaw the class of the state of o when, where and down to operate upon these fact for been made. In the American Medical had not occur made in the American Accusate the Control of Control Second available The open method in traction of the second in traction of the second in traction of the second in the second of the second in the second of mere not available the open method in treet (215). Mouleonate man accepted by Whiteler (105) and others at the start of Wiss). Hunt military military approaches followed in any accepted with the printing approaches followed in any acceptance of the start of which military approaches followed in any acceptance of the start of the (105) and others at the state of bottle bar and the British military sufficient followed in Section of management store the

the British mining, surgeons to yowed in gen eral this technique of management in gen recommendation of Sur Victor Horsley upon the following five procedures were advised thomas are procedures were survived.

1. The infured and septik area of the scalp must be freely excised tus toe fresh excessor.

2. The injured arm of skull must be fresh excessor.

And the ministration of skull must be fresh exposed by suitable facts or same must be freely ex-ord and included facts on same must be freely ex-ord and also down

a someone man.

3 Armal dum mater must be freely exposed. abound the critic circumstance of the woman anulus are course curvumerence or one mounts of a wide removal of bone

4. Foreign bodies, blood, and pur must be n As A creego pooles, Oloca, and par must be no mithout the breaking don of protective adhesions. Protective Admending.

The would must be left open from the first. 5. The would must be set open from the are.

There were some surround who still deprecised

any surped interference According to full (tip) an surgical interiorance According to four (trop and that the spread of spain a Anna ecocol canned that the spread of separation and the mortality is 1 nature by operation, and the moreous as a consect. It teaches that the brain if left above, detects, it travers that the than it we ware, and the to localize style that absences may become and the meaning appearance and the model and the operation should be recorded security and that operation around to control to cally in the presence of definite indication that sepaia is spreading explain an approximate of the state of the s angent and mounes (170) that the congent of conference were greater than operation were the operation three to five days (from the days (from It was recommended by injury in the operative technique are was In the operative technique are 11 mang of a metalic Cylinder 38 inches in domete.

said 35 inches in length which was placed in the

and 1/2 mence in united which was practic in or uccessed uses that in 3 may a positionation for bound was then closed about the drain the return was then tower about the man.

The Practice of Intervention practice of supervision of the control o A the Practice of intervention precede a space of the Erench and (ematique" (43) was employed by the French and the results in patients so managed were reported (as) Tables (socially 46%) posterior (43) Tables (467) and LaPoints (bortally 46%) cased mediate (excessive of the soft name, estimation of (43) A sumer (497) recommended a survey and no mediate occurrence of the soft parts, extinction of the soft parts, extinction mentic excesses or the sair party exceptions of the sair factor factors and distinguished functions. As foreign 115 and 116 functions with the sair factor factors and the sair functions of the sair Ingeneria of bone and drainage rutbout lowering mediate forces body at first, o He stated that 'm results are supplyed also by the state of the stat ACTIVE Companing Fas companies and by Autras Challenger Rouvilleds Faschet, and

ADTES CHANGER KOUTHOUS FRUCTES, and FROM THE REPORT OF THE PROPERTY AND ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY AND ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY ADDRESS OF THE PROPERTY AND ADDRESS OF THE PROPERTY ADDRES Commonly used in the localination of the foreign bodies during emporation (Villandre (200), Rog The Certain method as stated by Halmbridge (19) (so Coming Memory 23 scales by Demonsor consumer of the last section with the section of all sections to the last section of t capanic without deay of an extent, someone stands of the head. The due was a Sunspot avoides of the need. The dura was in closed and the Cavity drained by means of a robber to the cavity drained by means of a robber to the cavity drained by means of a robber to the cavity of tast and the cavity distinct of present of a stored to form of a f wind gauge was packed. The one berg foot) capresed the country to exceed the country to executive and the country that (infection that (infection) to the country to execute the country to exe social from capitated the common that tangential sounds of the skull should be operated upon its

rounds or the sent acoust the operator open as the sent of the sen Structure as pressure the advised removal of the first of accessible or if associated with appear the first of the advised with appear the first of tion. The mortality with these methods of treat too the mortality but these methods of treat being 34 per cent in all and 65 per cent in a second framenty operated guidance avoided on the management of the contract of the co Date of which open founds of the brain Stemhal of the brain Stemhal of the brain Stemhal of the brain Stemhal or t (ital) reported so had died (gree) its had on the most occurred to day, and to worself moder trained. (101) reported by had also tyre of 110 may returned to daily and 77 were still under treatment.

The critical of the late of dails in the fatal case were absent of the brain, encephalitis, and meningitis.

A policy of early operation debridement, and complete closure of the cranial wound was recommended by Barany (11 12 13) Willeams (216) and Cushing (44) being first suggested in 1913 by Clairmont (36) and Colmers (39) Barany (17) particularly grasped the importance of the removal of devitalized tissue and closure of the dura and scalp without drainage. Cushing (44 127) en nounced a surgical policy in dealing with this type of wound in 1918 advising a catheter suction method of debridement. Ultimately this technique became a standardized procedure. In view of this fact, a detailed description is presented of the "Directions to Neurosurgical Teams as out lined by Cushing (127).

It was first recommended that every scalp wound be considered as a potential penetrating wound of the skull and brain, a principle founded upon the observation of Hippocrates Nullum copilas vulnus contemnendum. As a part of the general attitude toward all wounds, an all or nothing plan of debridement was recommended The observation was made that patients with penetrating wounds of the brain were able to tolerate transportation rather well before opera tion but poorly during the first few days after operation. It was held that craniocerebral cases "in more or less shock need not undergo a period Local anesthesia combined of resuscritation. with morphine was suggested as the most suit able anesthesia (40) The directions stated that the chief source of the high mortality in cranial wounds was infection—infection of the meninges direct infection of the brain leading to encepha litis, and infection of the ventricles."

The principle recommended in the operative technique was the removal of the contaminated wound margins and of all foreign material from the brain along with devitalized brain tissue. The "tripod incision was advised to provide exposure of the underlying bone defect. The directions stated only in the case of large scalp defects is the switching of flaps necessary for closure, and it is questionable whether this is desirable. technique suggested for the exposure of the brain track was the use of three or four perforations about the akuli defect and the tilting up and removal of the bone "en bloc. It was advised to leave as small a bone defect as possible - a quarter of an inch margin beyond the defect suffices. The area of dural laceration should not be en larged. The debridement of the contused brain and track can best be carried out with production of the least damage to the brain by gentle suction and irrigation with a soft rubber catheter. The catheter detects indriven bone fragments as well

as does the finger and then these can be picked out with delicate forceps. Metallic fragments of small size are surprisingly well tolerated. No mention is made in the technique outlined concerning the closure of the dura. Horrax (102) and Rand (158) have stated that it was usually not closed since, as the latter reported, the incidence of sepais where the latter reported, the incidence of sepais where the dura was closed was disproportionately high." Use was also made of dichloramine T in oil as an antiseptic 'particularly suitable for infections in the central nervous system tissues.'

Craniocerebral wounds were classified into o special groups based principally upon the type of damage produced. These groups and their per centage of mortality were as follows (127) (45)

1 Wounds of the scalp (about 5%)
2 Cranial fractures without dural penetration

(10%)

3 Cranial fractures with depression and dural penetration but without extrusion of brain (20%)
4. Wounds usually of gutter type with brain

extruding and indriven bone fragments (30%)
5 Wounds usually of penetrating type with in

driven bone fragments plus metal (40%)

6 Wounds types 3 and 4 with penetration of bone and metal opening the ventricles (50%) 7 Craniofacial wounds or orbitofrontal or

temporopetrosal wounds in which the ethmoid or petrosal sinuses are open (60%)

8 Perforating or traversing wounds (70%)
9 Extensive bursting fractures with fatality
usually due to trauma rather than infection

(100%)

Harvey (88) recommended that every case in Group 2 should be explored and trephined that if the pathway from the external wound to the fracture is continuous then infection will, in many cases,-even with the simple depressed fracture without dural penetration-lead to meningitis or an abscess in a contused adjacent cortex. The statement was made in Harvey's report that patients in whom the dum was closed did badly. As a general policy it was advised to allow the dura to remain open and in addition to drain the scalp with a small rubber wick to prevent damming back of the infection which would lead to meningitis or a cortical abscess. It was noted that in the gutter type of wound classified as Type 4 the probability of infection was of the greatest degree and it was held that wounds in which infection of the scalp or its intra cranial contents is problematical should be left open for free drainage. Penetration of the ventri cle was found to result in a high mortality (Cushing noted no recoveries in patients in which the ventricle was penetrated by a metallic projectile.) The management of wounds involving the orbit consisted of enucleation of the destroyed eye, and removal of the indriven bone fragments from the bony orbit and the pulped brain from the track. Blateral decompressions were sometimes performed on extensive bursting fractures, but recovery was unusual

The mortality rate including the results in all types of wounds with dural penetration was 37 5 per cent, being reduced from 54.5 per cent in the first group of petients to 28.8 per cent in the last group (44)

#### BRAIN ABSCESS, FUNGUS, AND MENINGITIS— WORLD WAR I

The report by the Surgeon General (127) summarizing the complications observed following penetrating wounds of the brain stated that the principal cause of death in patients with head wounds after return from oversess was abacess of the brain The abscesses frequently occurred in cases in which there were retained foreign bodies. In 210 cases Cushing encountered 8 fnstances of brain abscess within a few weeks of injury (24) In 37 cases studied by Sargent and Holmes (160 170) the overwhelming frequency of brain abscesses in the first three to an months after injury was shown 28 patients developed abscesses in that period, whereas the complication appeared in a 6 to 9 month interval in an additional 7 cases. The latest appearance of brain abscess was in the eighteenth month. The history of World War I recorded that multiple abscenses were found to be practically always fatal, and recovery from a brain abscess without a capsule was extremely rare (127) It was stated that the primary stage of abscess formation was one of septic encephalitis for which surgical procedures would give no rebei. The ideal time for operation was after the formation of the capsule.

It is sometimes difficult to determine just how drainage of pus should be accomplished or whether simple aspiration with a needle should be made" (127) The procedures used for the drainage of abscesses varied in magnitude from the use of an osteoplastic flap to that of a simple trephine opening. It was noted that the best results in the treatment of this complication were obtained in the drainage of single abscesses with capsules. A second opinion stated that consideration of all the facts fustifies the conclusion that the most favor able time for accurately placing a drainage tube in an abscessed cavity is when the pus is first discovered. It is often possible to empty the abscess completely at this time, and there may be very little subsequent discharge. The drainage tube

should be fixed to the scalp and should not be removed until drainage has discontinued (1:1). Brain abscss unrelieved by operation was considered to be fatal yet the vast majority of patients (0.7 % in Surpert and Holmes series) deed after the drainage of pus (1:8).

Fungus was observed to be one of the most frequent complications following the drainage of cerbral abscers, and the mortality was high. A fungus was the "fresult of an undrauned abscrawith or without hydrocephalms or an energhalitis." The notation was made that the treatment of the condition of fungus is as a rule unestifactory. It was beld important that any associated accumulation of pus should be drained (527).

#### RETAINED FOREIGN BODIES-WORLD WAR I

Prior to World War I, a conservative attitude was taken toward the removal of foreign bodies within the cranial cavity as pointed out by Pilcher (152) in an excellent review of this subject. Sir Benjamin Brody in 1828 (20) approved of this policy. Later however cases were reported in which the foreign bodies within the brain substance were removed. In the Medical and Surgical History of the War of the Rebellion (126) 85 cases of bullet removal were reported. Andrews (4) in 1868 and Wharton (214), 10 years later advocated the removal of retained bullets when they were localizable and accessible. Morris (133) in 1887, Papallion (143) in 1894, and Hewett and Lidell (93) in 1881 held this same view Phelps (150) in 1906 stated, There is probably no authenticated case in which the bullet left in the brain substance has failed to work muschief DaCosta (46) in 1910, wrote 'that practically every lodged bullet (in the brain) constitutes a fatal condition and it should be re

moved if possible, even if there are no symptoms." Following the use of roentgen rays in visualiz ing and localizing intracranial foreign bodies, first suggested in 1896 by Stubenbord (152 184) re moval became a more practical procedure, and was more widely practiced. (Rouvillois [163], Cazamun [34], Regard [159] and Villandre [200] recommended removal of all foreign bodies.) As a result it was observed that a relatively small number of retained foreign bodies were discovered in patients with head injuries following their re turn to the United States after World War I (137) In two series aggregating 392 patients with head injuries at general hospitals, 19 had intracranal foreign bodies which were either pieces of metal or bone fragments. Frazier and Ingham (63) reported our percentage of retained foreign

bodies which is 10% is almost identical with that bounds which is 10/0 is annow identical with their recorded by Sargent and Holmes 164 in 1567 occases, or 11%. Of a series of 9 patients with re tained missiles treated by Bagley (9), 7 were operated upon Four had an associated abscess with a positive culture. In 3 cases there appeared to be no signs of brain disturbances from the foreign bodies and in these the cultures were

Frazier's (127) indications for the extraction of foreign bodies were as follows Foreign bodies causing encephalitis or epileptic senures should be extracted those apparently latent should be left alone. This opinion was subscribed to by Bagley (9) Demmer (52) Von Eiselsberg (204) and Coleman (38) Wagstaffe (206) noted that the incidence of epileps) was alightly higher among those with retained foreign bodies

# INTERIM PERIOD DETWIEN WORLD WARS I AND IT

Interest in penetrating cranial wounds alack ened after reviews were made of war experiences techniques evolved were considered as eatisfactory. The possibilities in neurological surgery revealed by the war focused attention upon civilian neurological problems. A rapidly broad ening field resulted in the training of a number of general surgeons into neurological surgeons who became experts in this particular speciality and in due course of time trained others

There was thus available at the start of World War II a considerable number of trained neurosurgeons as well as a rapid means of training additional men through abort courses or by pre ceptorahip In contrast to World War I, this was a major advantage true in all specialties when medicine mobilized for war

A second advantage at the start of World War If lay in the improvement in transportation and its means of mass production adequate methods formerly used were replaced by streamlined methods employing a greater number of men, units, and vehicles and the air as a medium for transportation. Expeditious evacu ation from the point of injury to hospitals for definitive treatment, recommended early by Ton nis (191) was constantly a foremost considera tion although it was subject, at times to mair mountable difficulties. This factor was of major importance in the management of cranial wounds

Research during the interval between the wars had resulted in the introduction of sulfonamide drug therapy in 1936 with evidence of astonishing results in the treatment of infection

Sulfonamide therapy was observed to be par 36 r ticularly efficacious in the treatment of infections caused by the streptococcus of the beta hemolytic type the Lancefield Group A hemolytic organ isms, the meningococcus pneumococcus and gonococcus Staphylococcal infections, however were not benefited to the same degree The mode of action of this drug by bacteriostasis per mitted the control of injection of the central nervous system following cranial nounds in a high percentage of cases.

A widening knowledge concerning body chem istry fluid balance anoxia blood replacement the treatment of shock and wound healing added significantly to the effectiveness of the surgical

The pathophysiological conditions of the brain resulting from trauma were more clearly under stood Many contributions to the literature both of an experimental and clinical nature, had been made during the interval between World Wars

An important contribution pertaining to the improvement of the technique for the debride ment of penetrating wounds was made by Horrax (99) in 1940 He suggested that such wounds be treated by more radical excision with coning of the track of devitalized tissue in place of the catheter suction debridement. This suggestion later put into practice in World War II proved to be a significant aid in treatment.

Under these circumstances, neurosurgeons in Order these chromosances, hemosurgeons in general faced the cranial wounds produced in World War II, adequately prepared organized and equipped.

## MECHANISM OF INJURY FROM BULLET AND OTHER PENETRATING WOUNDS

Wounds from high velocity bullets and shell fragments are relatively recent experiences in military surgery It is only during the past 60 years that high velocity bullets have come into use, and only since World War I that high velocity shell fragment wounds have been noted with frequency. Whereas a low velocity weapon may traverse the body mainly with injury to the im mediate neighborhood of the track high velocity missiles cause extensive damage also at a distance from the track in the tissues . It is not uncommon to see organs bones and other tissues severely damaged at some distance from the bullet passage. Usually blood vessels and nerves are more resistant because of their elasticity and thus they may escape anatomic injury On the other hand, vessel injury may be seen at a distance from the missile track by splash of the blood against the

intima with longitudinal tears. Thrombosis, sec ondary tear with hemorrhage from necrosis, or aneurysins, may ensue.

The agents of injury especially concerned in this study include bullet and shell fragments, as well as certain tools and utensils used in low velocity penetration of the cranual cavity most instances, pointed bullets are seen in mili tary injuries, whereas round nosed missiles are found in civil practice. In practically every in stance, bullets used in military practice are facketed with a core of lead in the center Jacketed bullets usually retain their shape except at impact with bone at velocities of 2 500 feet per second or more. In civilian practice with soft bullets, it is common to see the missile shattered into many fragments at impact. In rifle injury the muzzle velocity of the bullet may be 2,000 feet per second or more, and the rifling causes the bullet to rotate about its long axis approximately 1,000 times per second with a velocity of 500 or more feet per second. Sir Victor Horsley (104) has attributed the explosive effect of high velocity missiles to the rotation of the bullet about its axis rather than to its muzzle velocity. This will be discussed in greater detail in the next few paragraphs in connection with recent experiments pertinent to the problem

Shell iragments may have extremely high velocities, and it has been estimated that they may travel from 4,000 to 5,000 feet per second near the site of explosion. They vary in size and shape and they are more likely to become contaminated with clothing, hair and helmet lining which may be introduced into the cranial cavity Whereas bullets usually cause a neat wound of entrance and possibly also a clean wound of exit, shell frag ments may cause large, lacerated wounds of en-In accordance with the velocity irregular tears or bruises of the struck area may be seen. Frequently the fragments remain in the cranul cavity It is interesting to note that in certain instances tiny fragments may be dispersed within the cranial cavity Among this group of cases there may be instances of relatively little brain damage.

Low velocity penetrating wounds of the skull and brain may be produced by kulfe blade, are pick, glass, umbreils end and many other tools or every day objects. Ordinarily infection is seldon introduced into the cranial cavity and this may be partly explained by the fact that during the period of thrust dirt particles are held back as the object enters the scalp and skull.

A very important difference between high velocity and low velocity injuries is to be found in the type of damaged brain about the missle track. With high velocity injury there is online at long distances, whereas with low velocity belief wounds and with stab and similar penetrating wounds, there may be no damage except for the track in the tissue. Wilson (218 219) fates that

track in the tissue. Wilson (218 210) states that the wounding effect depends upon, first, the amount of energy transmitted to the times second the velocity of transmission third the direction of energy and fourth, the density of the tissue." The amount of energy transmitted to the tissues depends mainly upon the velocity of the weapon. Mass times the square of velocity divided by 2 is the formula to calculate the amount of energy With velocities up to 2,000 feet per second the amount of energy utilized, as evidenced by damage done by the musile, is proportional to the square of the velocity. The time of transmission of energy to the tissues is ex tremely important and this depends upon the velocity of the injuring object. The shorter the time of transmission, the greater the horse power expended in a unit of time. Callander (30) states that with extremely high velocities the wounding effect of the missile varies as the cube of the velocity and only as a single power of the mass. The density of the tissues is also important. Wilson (218, 219) working with gelatin solutions, concludes that the energy of the missile is dispersed inversely to the square of the percentage density that is in a 5 per cent gelatin solution explorive effects are approximately 4 times as great as in a to per cent solution o times as great as in a 15 per cent solution and 16 times as great as in a 20 per cent solution The velocity imparted to the there about the track is important in that but of timue bone fragments, and other organic matter may act as secondary missiles with more ex tensive injury. If a bone is struck by a high velocity mustle near the wound of exit, there may be extensive shattering with skin loss. Ordinarily the elasticity of the skin protects it from extensive tours and lacerations. Whereas a discreet wound of entrance and exit may be seen with a high velocity bullet injury of the thigh the skinned extremity of the same experimental animal will be shattered to bits by the same missile injury (31)

The polping effect at a distance from the mismental work. Sir Victor Honley (104) attributed this to the explosive effect of the bullet in tapessage through the tissue. He thought that the rotational activity of the bullet, rather than the mustle velocity caused the explosive effect. Recently Black, Burns, and Zuckerman (15 20)

have shown that when a high velocity pellet with out rotational acceleration enters a gelatin cube it causes a tail splash at the entrance. As the missile traverses the gelatin there is a marked swelling and enlargement of the cube to 4 or more times its previous size This is caused by the formation of a temporary cavity which almost completely disappears as the pellet passes through and the gelatin cube returns to its former size Black, Burns and Zuckerman (15, 230) emphasized that rotation of the bullet on its long axis in rifle in juries is not the cause of the explosive effect. However they admit that a change in the posi tion of the built as it enters the tissues or as it passes through the same because of precession, may alter the dimensions of the track, but the temporary cavitation about the track is due to radial velocity imparted to the walls of the track by the passage of the musile Butler Puckett Harvey and McMillan (23) have studied the passage of spherical missiles with the use of a microsecond x ray apparatus with which x ray pictures may be taken in one-millionth of a second or less. They have shown that in its passage through the cranial cavity the missile causes a large temporary cavity which expands rapidly and undergoes several pulsations before the tissues return to premjury dimensions The passage of the misule causes high radial velocity imparted to the tissues about the track which in turn causes the temporary cavity Within the cranial cavity this produces an intense increase in intracranial pressure with maceration and pulping of tissue at long distances from the missile track and extensive disorganiza tion of the cranial bones with fragmentation and separation at suture lines. In order to show the role of the intracranual contents in such injuries the following experiments were carried out. A cat, under anesthesia, was struck in the head with a sphere 4/32 of an inch in diameter with an im pact velocity of 3 800 feet per second There was extensive fracturing of the skull with fragmenta tion and separation at suture lines. In another cat the skull was cleansed of the soft tissues and brain and a similar injury merely caused a wound of entrance from 6 to 8 tumes larger than the sphere and a small wound of exit only a little larger than the missile. The comparison of the perforations of the skull in this instance with the extreme fracturing and fragmentation in the ex periment in which the intracrunial contents were intact is most convincing

Wounding by shell fragments has been ex tremely common in World War II Only 15 per cent or less of the crantal wounds entering the evacuation hospital were from bullets. The great

est majority of the bullet wounds of the head 363 caused death on the field of battle Shell frag ments vary considerably in size shape, and con tour They may travel at extremely high and then again at low, velocities. The irregular con tour causes extensive laceration and the missile is more prone to carry dirt and foreign matter into the body The mode of injury is essentially the same as with a high velocity bullet if the fragment is stopped by the body while travelling at a high speed Severe lacerations of the brain with pulping of the cerebral substance along the track oc curs In many instances penetrating shell frag ments remain in the cranial cavity a few may perforate.

In penetrating low velocity wounds such as those caused by knife blade umbrella end or fan blade there may be a tearing of important vascular channels and infection may be introduced into the cranial cavity The brain about the track of the missile is not pulped and therefore can successfully resist certain amounts and types of infection.

The mechanism of sudden death following pen etrating wounds of the brain has been investi gated by Polis (156) and Webster and Gurdjian (200) It was observed to be due to a paralysis of the vasomotor and respiratory centers in the medulla With an increase in the velocity of an injuring bullet, there was a corresponding in crease in the severity of the physiological effects

# METHODS OF TREATMENT—WORLD WAR II

Certain generalizations regarding the treatment employed in World War II warrant mention as a preface to the details of operative technique used in high velocity wound management these is the attitude toward patients with crantal wounds. The treatment of this group of patients was undertaken not only from the standpoint of rehabilitation for further duty but as a humani tarian obligation Regardless of the severity of the wound the courage required in the collection of the patient from the point of injury the time employed in primary care, or the efforts con sumed in effecting postoperative recovery conscientious effort was rande to accept that re sponsibility by all personnel involved philosophy on the part of surgeons nurses company aid men and hospital corpsmen was a significant factor in the excellence of the care which these patients, in general received

The campaign in Africa and in Italy early established the value of the neurosurgeon in the Evacuation Hospital and set a pattern which settled any doubt as to where the treatment of

cranial injunes should be carried out, in either a last moving or a stationary type of warfare. Auxiliary surgical teams supplied the personnel for these bespitals if neurosurgeous were not available. Following operation and after a period of observation in the Evacustion Hospital for from 5 to 10 days the neurosurgical patient was evacuated to a "Neurosurgical Center a general hospital so designated, for late postoperative care and convilescence General bospitals were deployed as near to major activity as possible, reaching such positions for operation within one month after an invasion

A second practice of major importance was the modification of neurosurgical operative tech nique to war wound needs following the suggestion made by Horrax (90) in 1940. The availa bility of electrocoagulation and efficient suction units resulted in the adoption of more radical measures in débridement. It was also recognized that "brain areas could be wholly or partially removed without detriment to the individual (00) By the older technique "a careful but necessarily slow and tedious dehridement of the wound in the brain was accomplished, an average of two hours being required for the serious, deeply penetrating wounds (99) By modernizing the technique, operations were performed rapidly with time saving short cuts. Skillful co-opers tive amouth functioning teamwork usually assisted the surgeon. Ability experience and confi dence acquired in previous training implemented the surveon's desire to accomplish his purpose as quickly as possible. Laborious attempts at hemoatasis were replaced by rapid coagulation slow irrigation debridement was replaced with total suction debridement of all devitalized tissue. Modern electrical apparatus provided necessary illumination From the preparation to the closure of the scalp all but essential manipulations were eliminated.

#### PRIMARY DEBRIDEMENT

All cases with scalp wounds were considered as cases of penetrating wounds of the brain unless proved otherwise and all but the obviously fatal wounds were explored (Fig. 2). Following neurological examination, routine roemigen studies of the shull were made. Stereoscopic views were held to be exsential by some (32) but the pressure of work or failure of the patient a co-operation often made any additional studies impossible. Viscalization of the bone fragments and actual count was attempted. In general, the neurosurgeon was able before operation to visualize the path of the penetrating missile and the degree of bone injury

and imbedding of the bone (ragments. Individus) surgeons varied in their standards for determining the inoperable patient, but in general, except when the pressure of work was too great, all but the obviously fatal wounds were explored. Par ticular attention was given to the selection and operation of patients with increased intracerebal bleeding who failed to respond to respectation and those with intraventricular wounds (80) Intensive resuscitation measures were employed consisting mainly of the transfusion of whole blood and plasma, the employment of warmth rest and pain relief and the provision for ade quate pulmonary ventilation. Craig (41) has recommended the use of oxygen to help reduce increased intracranial pressure The high inddence of associated injury (approximately twothirds of the patients observed by Gaynor and Gurwitz (67) presented wounds in addition to that of the head) required consideration in planning treatment

Eden (58) has stated "that there is no doubt that the surgeon who first operates on an open wound makes or mars it-ideally the initial operation should be the final and complete one The principle of an all or nothing debridement stressed by Cushing (127) was followed in principle although not always attained. The scalp was prepared by complete and thorough shaving and washing about the wound with soap and water for 10 minutes. The use of an antiseptic was elective. Local infiltrative anesthesia was used whenever possible, supplemented by the use of preoperative morphine analgesia. Caums (24) has objected to the use of morphine, while Horrax (101) believes it may be used in widely open compounded wounds. Slemon (178) used local anesthesia in 56 per cent of penetrating bram wounds with a basal narcosis induced by alopon (gr 1/) scopolamine (gr 1/150) and huminal (gr 3) When a general anesthetic was required, the intratracheal administration of ether was preferred. Sodium pentothal has been used with soc cess (129) but caution is required to control the depth of anesthesis (67) Supplementary pentothal anesthesia was used in 15 per cent of the patients operated upon by Munslow (136)

Long curved meditons of the scalp which the cluded the total excision of the wound of entrance were made in place of the 'tripod type formerly med. They were planned to permit an adequate blood supply to the scalp. The incition was designed with the purpose of securing scalp closure at the end of the operation. The perioranism was carefully removed from the bone defect after debufdement since its later use for dural grafting







Fig. 2. Civilian patient presenting a gutter type wound of the right parietal area by a 38-calibre revolver selfinflicted. She was operated upon 6 hours after injury Through curved inclaims the area of bone defect was ex-

posed, fragments of bone and pulped brain these were removed. The dura was débrided. The dural defect was re paired with a fascia lata graft. The bone defect was subsequently repaired with tantainm.

was possible. The bone defect was enlarged with a rongeur Frequently a bur opening was necessary adjacent to the point of entrance Fragmented bone was removed as well as any additional bone to expose adequately the injured dura and brain. More severe fragmentation of the inner table has often been observed (57) The en bloc' method of bone removal was usually not employed After the excision of damaged dura, the track of the missile in the brain was debrided by suction removal of the devitalized cerebral tissue, blood clot, and bone fragments. A coring of the track to normal tissue was frequently accomplished under direct vision with a lighted retractor as suggested by Horrax (99) The utmost care was employed to spare injury to the cortical vessels. Foreign bodies were extracted if at all possible the electromagnet being employed by some Enter ing the ventricle was avoided but not at the sacrifice of incomplete débridement Saline solu tion was used in irrigation of the track and wound although not advised by Munro (8) doubt existed as to whether all bone fragments were removed the finger was gently used in the large tracks to feel for the fragments The dura was closed by means of a graft of pencranium temporal fascia fascia lata or preserved cadaver dura Cushing silver clips were sometimes used In place of sutures by Havnes (89) In some in stances, to conserve time the dura was not closed. Two layer interrupted silk closures were attempted in all cases Relaxing incisions were not used. In cases of severe scalp loss over a defect of skull and dura a flap of scalp was used to cover the defect. The bare pericranium was im mediately grafted (split thickness) An osteo-

plastic flap has been recommended in the small clean wounds associated with persisting neurological signs for exposing an intracerebral hemor rhage (25) The local instillation of sulfanila mide penicillin or combinations in the brain track and in the overlying wound was done by some surgeons (26 58 171) Cairns (26) stated that in recent brain wounds (up to 72 hours old) penicillin can be applied in a powder (5 oco units of penicillin per gram of sulfanilamide) followed by primary closure of the wound ' In 129 cases so treated fatal infection developed in only 2 He stated also that sulfanilamide and sulfathiazole have been used in some hundreds of brain wounds with no reactions of the kind de scribed by Watt and Alexander (208) Following operation all patients were treated systemically with sulfadiazine or penicillin the chemotherapy begun at the time of wounding or shortly there after being continued. It was discontinued when the wound was healed

#### DELAYED PRIMARY DÉBRIDEMENT (24 HOURS—10 DAYS)

The observation first made in World War I that patients with crantal injuries are transportable with greater safety before rather than after operation resulted in a late primary debridement of cranial wounds being done in many instances (7) Unlike patients with delayed wound care in World War I who travelled well but ultimately died of infection many of these patients survived. Generalized infection was usually prevented by chemotherapy and the localized encephalitis was reduced in degree and even controlled. Thus patients in this class in

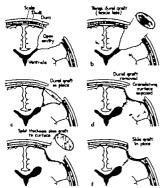


Fig. 3. Open exteriorization method of treating brain aboves with graft of facial tata in patient with meanive loss of scalp, skull, and dura. The aboves is totally dibbided a temporary facial star grift is sutrent to the instact dural edge, which prevents lexings of the cerebrospiral finial and bernation the scalp is not closed penicillin solution is injected through the graft into the cavity. The temporary graft is removed in from 5; to so days and a split thickness graft applied to the area, the scalp being conserved for caminoplasty.

general, did not present wounds with an extruding brain and meningitis as formerly

The surgical management of this type of wound was similar to that described under primary debridement. Success depended upon total wound excision and thorough debridement of the brain track. A dural graft was not used. The local in stillation of penicillin for several days post operatively in conjunction with its systemic use, aided in wound healing Terian (Russian) (188) reported experiences with delayed operations. In 71 per cent of 102 cases, operation was under taken within 20 days after injury usually on the sixth to eighth day Eight of the patients died 6 of these had meningitis at the time of operation. The fatality rate of 182 cases without meningitis was 1 1 per cent. The conclusion was made that "the time interval after wounding is less im portant in cramocerebral injuries than meticulous and specialized care in investigation, operation and after treatment." The dura was not closed in any of these cases and the scalp edges only were apposed over the wounded brain by a lex

Delayed primary débridement of cranlocarbral wounds differs from earlier recommendations made at the start of World War H. Hornar (10) t stated that after from 24 to 48 bours 'the whole wound should be packed widely open under vasclined game or rubberized tissue and the vasulting fungus allowed to beal by granulation and recode." Schnize and Betzendahl (173) also suggested that after 48 bours the penetrating wounds should be treated as a brain abscess with 'open drainage."

#### SECONDARY DÉBRIDEMENT (10-40 DAYS)

Healed wounds presenting retained bone frag ments within the brain were frequently encount ered [Italy, 13.4% France, 31 9% (210)]. These were usually the result of necessary haste due to lack of time at the primary debridement when the all or nothing' rule was not followed. By means of roentgen studies the fragments were accurately localized and after evening of the bone defect a conservative secondary track exploration with removal of the bone chips was performed This policy has been followed by Eden (58) Schwartz (174) Schorstein (171) and Rowe and Turner (165) When necessary a dural graft was applied with safety since the wound was not grossly contaminated as in patients requiring late primary debridement. The scalp was closed. Tonnis (101) reported that all cases which had been provisionally operated on for tangential wounds of the brain showed prolapse, with spinters of bone in the depths of the brain. The prolapse was reduced by repeated lumbar punctures. Under local anesthesia, the opening in the skull was then enlarged the depths of the wound freed from dead matter, and any remaining splinters of bone exposed and withdrawn. The wound was kept open by a Mikulicz tampon soaked in prontosil, to assure the free escape of ducharge. It was noticed in the wounds which had not been tampered with at the front that prolapse of the brain had been hindered by the splinters of skull At both the primary and the left in place secondary debridements, the attempt was made to remove completely all organic material, consisting mainly of bone chips and of the inorganic material when possible.

In general, the management of retained metal life fragments followed the principles set forth by France (1sr). Some (6sr ano) have reported that ragged metallic fragments were found to be iden with organic material—tiny bone fragments, harr and belimet linking—and cultures of such missiles, as well as of bone fragments usually re sulted in the growth of pathogenic organisms. Not only the size of the metallic foreign body but the irregularity was of importance. It is reasonable to view the presence of retained shell fragment particularly as a threat to a future inflammatory, complication. Such findings usually do not occur when the penetrating missile is a smooth intact bullet.

#### CONSIDERATION OF BRAIN ABSCESS

The term brain abscess, as used in this article describes a purulent collection or collections within the brain substance which followed track injury produced by a penetrating missile. An incidence of 16 per cent occurred among 206 patients (in cluding German presoners of war) with penetrat ing wounds of the dura and brain observed by Webster Schneider and Lofstrom (210) The incidence among American wounded was 14 per cent in Italy and 19 per cent in France (210) Cairns (27) has reported an incidence of abscess formation in 25 per cent of patients in whom wound débridement was incomplete or performed late A similar proportion was estimated by Rowe and Turner (165) In Ascroft s series (25) 75 of 202 patients developed brain abscesses under his care. Eden (25) however had but 1 case at tributed to the fact that cases were received at an earlier stage and before they had been operated on by the general surgeon

No case of abscess was noted among patients in whom the dura was not penetrated (210). The abscesses occurred early and were associated with wound infections and frequently with hernias or fungl. Usually they were not encapsulated but were localized by reactive inflammatory tissue of a dense quality at the site of the original débridement and also in the track produced by the mi. sile or the bone fragments. Komean ky (114) noted that in 69 per cent of cases brain abscesses 'were due to an infection of the wound. In 28 per cent they were cortical and in 52 per cent intracerebral. They occurred 2 or 3 weeks after injury.

Several surgical methods of management have seen employed in treating this type of complication (210). The techniques were based primarily upon a complete reddendement of the wound and the abscess by means of excl. ion of all inflammatory tissue and the abscess levell the latter being removed by suction. The resulting wound was then treated by (1) closure of the scalp (2) closure of the scalp about a tube for the instillation of penicillin (3) extenorization of the cavity (21) and (4) extenorization with a temporary dural erait (Fig. 3).



Fig. 4. This patient presented a brain absects associated with a retained bone fragment and an infected wound. Management consisted of excision of the wound and the absects followed by the daily instillation of penicillin solution through the scalp. Primary healing occurred.

Webster Schneider and Lofstrom (210) con cluded that an early abscess following a penetrat ing wound of the brain must be treated by complete removal and not by drainage without excision (Schulze and Betzendahl [1-3] in 1040 recommended simple open dramage ) and fur ther that no single technique was applicable to all situations. There were situations in which it was possible to close tightly the overlying scalp after wound excision and extirpation of the abscess (174) This is a technique similar to that used for late purulent and nonpurulent undebrided wounds which has been successfully practiced with or without the local use of penicillin Drainage of the abscess followed by the local instillation of peni cillin through a small rubber tube placed into the cavity has been employed by Eden and Cairns (25) and Lowe and Turner (165) The latter use a technique of complete evacuation of the abscess and the removal of all foreign bodies establishing drainage by use of a Penrose sheath or rubber tissue drain or occa lonally a soft rubber

tube In addition, a Dakin tube is introduced into the depths of the cavity. At this tune in mixture of dry penicillin and sulfanilamide is placed in the cavity. In contradistinction to the ordinary practice of leaving the wound entirely unsutured, it has been found leasible, with the aid of chemotherapy to carry out a nearly complete closure in many cases. Webster Schneider and Lofstrom (aro) found it difficult either to aspirate through a small rubber tube or to meet penicillin solution and were obliged to remove the tubes in 48 hours and inject the solution through the scalp (Fig. 4).

In a number of unstances these methods were not successful namely when the frontal or masted sinuses were involved when the scalp was edema tous and necroit when there was a large scalp defect through loss of tissue when débridement of the abscess was not as complete as desired. A special form of management was then used which

was as follows After the usual complete redebridement of the wound and excision of the abecess, the remaining cavity was covered temporarily by means of a graft of fascia lata sutured to the debrided dural edge. This temporary graft and the mirrounding bone edge were covered with vaseline gauge, the scalp wound being left open Penicillin solution could be injected daily through the graft mto the site of the abscess. At the end of 15 days, the fascial graft was removed and the underlying brain was prepared for a split thickness graft, which was applied from 5 to 7 days later without disturbing the scalp Any mobilization of the scalp was avoided in consideration of the subsequent cranioplasty which would also complete the

scalo dosure The temporary dural graft of fascia lata served two purposes first, it prevented cerebral hemia tion, and second, it prevented cerebrospinal fiuld leakage. Following the debridement of an abscess with disturbance of all the barriers to infection meningitis may result or diffuse infection may be present at the time of the attack upon the abscess. In either situation postoperative cere bral swelling herniation and fungus formation may result if the debrided area of the abecess has been extenorized without a covering A nack or drains may be extruded. If the scalp has been closed over such a defect in the dura there may be extrusion of the brain subcutaneously. The use of a fascial graft as a temporary covering prevents such herniation until the infection is brought under chemotherapeutic control. Lenkage of cerebrospinal fluid into the frontal sinuses may also be controlled by the temporary graft, which is removed when the bram has scaled itself about the line of normal dura. A temporary graft was used as it was held to be unwase to bury a faschi graft in an unclean wound because of the risk of necrosis of the graft and continued wound infection. However, Rowe and Turner (165) have nocessfully burded fascula fraits in unclean women's

Lebendenko (118) reported a mortality of 101 per cent in the treatment of 211 patients with brain abscess, and his notation concerning the technique of operation was that 'if the walls of the abscess are intact, the abscess is removed in (David and Ferey [47] found that 24 per cent of 82 patients with fungus ded ) Komeamky (114) reported a fatality rate of 18 per cent in surgically treated cases of brain abacess. Bukulov (Russian) (22) reported that 16 8 per cent of the patients with abscess died when treated at a specialized evacuation hospital. The mortality in Ascroft a cases was 25 per cent (25) Rebater Schneider, and Lofstrom (210) found that 17 per cent of the patients with abscesses treated by various methods died. The mortality among those treated by the use of a temporary dural graft (mainly frontal sinus wounds) was 18 per cent.

#### CONSIDERATION OF WOUND INFECTION YUNGUS, MENINGITIS

The occurrence of wound infection was observed to be dependent upon several factors. These included the season of the year and the associated weather conditions the terrain on which the fighting took place the mobility of the war fare the speed of evacuation the number, type, and severity of the casualties the degree of blood loss and the extent of the replacement. These influences, and probably many more such as the number of dressings and the exposure of the wounds, had a bearing on wound healing. It was of interest to compare the incidence of wound infection in patients in the Italian and French theaters with that in a group of German presoners of war A high incidence of wound infection oc curred in the latter group when certain known fac torsincluded (1) late primary wound débridement and (2) inadequate or incomplete wound debridement. On a rapidly moving front under ideal weather conditions (late summer) the POW pa tients were treated by the same chemotherapeutic routine as wounded American soldiers. The comparative statistics were as shown in Table II (018)

The companson warrants the conclusion that the prime factors in preventing infection are early and thorough wound excision Caims (27) found

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Brita abscess	lang	organism was true ty	pe (Friedmine)

Incidence of retained bone fragments

that in fresh cases operated on by neurosur geons the incidence of postoperative intracranial infection was only 3,7 per cent Rowe and Turner (165) have reported that approximately 15 per cent of the head wounds showed some degree of Slemon (178) found an infection rate of 129 per cent. Plans for wound care must be designed to meet the complications arising from infection delayed and hasty debrudements. The average time interval between wounding and operation VAS 276 hours (maximum 5 days minimum 6 bours) in patients reported by Slemon (178) The importance of wound infection to late sequelae

Although fungus of the brain was a frequently has been shown by Ascroft (7) encountered condition (210) this complication did not constitute the problem which it appeared to present in World War I By means of chemotherapy a spreading encephalitis was controllable and fulminating cerebral swelling and extrusion of the cerebral tissue was prevented The streptococcus organism responsible for rapid and fatal infections in World War I was particularly vul nerable to sulfonamide and penicillin therapy Cauras (27) reported that the staphylococcus aureus is a frequent wound contaminant proved by the bacteriological examination of wounds during the Sichian campaign. The Russians (25) found that only 2 of 300 head wounds were sterile and that a large proportion of deaths were due to anaeroble pathogens (Report by a Committee of

The principle of closing the dura following Soviet Scientists, 1943 [25]) primary wound debridement prevented post operative hermation Instances of extrusion of the brain with a separated and infected wound were frequently the result of an underlying cerebral abscess. Relief was obtained after excision of the fungus and total debridement of the associated abscess usually pocketed under the extruded

A meningins which may have been present was usually completely controlled by means of con tinuously administered penicillin or sulfadisaine Exception to this occurred when the

invading organism was drug resistant, being then usually of a gram negative type (Friedlander s bacilius) An unsubsiding meningeal infection was also found in the presence of a cerebral ab-

On failure of a patient to improve normally scess which sustained it following primary debridement with clinical evi dence of infection as the cause of the failure, three steps were taken the chemotherapeutic program was revised to meet the new demands, efforts were directed at proving the presence of an abscess and cultures were made of the cerebrospinal fluid (210)

## SULFORANIDE AND PENICILLIN THERAPY AND BLOOD LOSS REPLACEMENT

Both sulfadiaxine and penicillin were used in the treatment of the cases presented by Webster Schneider and Lofstrom (210) Those patients who were observed in the Italian Theater were in the main treated with sulfadiazine while those in the French Theater received penicilin The inci dence of wound infection in each series of cases did not vary significantly being 19 8 per cent and 23 6 per cent respectively Of the group of pa tients with cranial wounds complicated by brain abscrsces, the first 15 were treated with sulfadia zine (penicillin being used only when sulfadiazine failed to control the infection) The latter 18 were, in general treated with penicillin An appraisal of the results (mortality) based upon the type of chemotherapy employed showed that in the group of 15 cases treated with sulfadingine 4 deaths occurred Penicillm also failed to control these fatal infections when used after the inci ficiency of sulfadiazine was apparent Among the

THE RELATION BETWEEN EPILEPSY AND WOUND SEPSIS TABLE III

ABLE III	AND WOT	ND SEX-	1.00	Per cent
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Reend healed	in 5 days in from 15 to 60 days	59		1_92_
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18 patients who received penicillin 5 deaths re sulted. Three of the 18 patients were given sulfadiazine treatment when the penicillin failed and all presented favorable outcomes. In this limited analysis, an outstanding difference in the effectiveness of these drags did not seem to exist. Others have observed the superiority of penicillin (8a) Slemon (178) observed an incidence of in fection of 31 2 per cent in 32 patients treated by the local application of sulfathuasole while the rate decreased to 9 2 per cent in 184 cases treated locally with penicillin and a sulfa drug both groups sulfadiazine was used systemically Pilcher (154) in over 1,000 experiments has studied various aspects of the chemotherapy of intracranial infections. Among many observations, the following are the most significant

r Sulfathiazole may produce severe or even fatal convulsions when applied to the brain and abould never be used (Contrary to clinical ex

perience of Cairns [25])

2 Experimental staphylococcal meningitis was markedly benefited by oral sulfadiazine but not by oral sulfathiazole

3 "Penicillin when given intravenously was ineffective in staphy lococcal meningitis, but when given intrathecally it greatly reduced the mor tality rate.

4. Penidllin given intrathecally in normal dogs produced variable degrees of mild irritation and pleocytosis in the cerebrospinal fluid, apparently dependent largely moon the amount of impurity in the preparation of penidlin.

The healing of open cerebral wounds con taminated with staphylococcal organisms has been augmented by the local use of sulfadiatine but was apparently unaffected by local sulfathia sole or local penicillin. (Contrary to clinical observations)

6 Chemotherapeute agents given systemically have benefited experimental cretinal absesses only in so far as associated meningitis, if present was benefited. In other words, our experiences indicate that such drugs probably do not gain access to well-encapsulated infection of the central nervous system.

The use of either drug it appears, is effective

only in proportion to the thoroughness with which the source of the infection is irradicated by surgical measures.

Blood replacement must be recognized as an

Blood replacement must be recognized as an important factor contributing materially to the control of infection and the production of satisfactory wound heating. A lowered hemoglobin and hematocrit were frequently encountered in spite of previous transfusions in forward installa

tions, particularly in patients with associated injuries. The latter occurred in 36 per cent does group of patients with canalal wounds (130) and in 38 per cent on the general hospital, liberal use was made of whole blood transfurions. Secondary operations were performed after normal levels were established and further replacement was continued as needed. German prisoners were observed to have a secondary anemia greater than that found in the American wounded, and this may have been an added factor related to the common observation that wound healing in the former group was notorfoully boor.

#### SUMMARY AND RESULTS

Comparison of the types and results of trest ment in groups of patients with war wounds re quires qualification as to the point in evacuation where the observations were made. The highest mortality of cranial wounds occurs on the battle field itself Little information exists as to the character of these early fatal wounds. The neares the front line the higher the mortality (25) The casualties who survive wounds for at least 8 hours reach evacuation hospitals field hospitals, or similar units for definitive surgical treatment. Death serves to process the wounded during the early hours of infury The greater number of neurosurgeons available in the American army resulted in the performance of operations upon severe and extensive wounds. In other armies the 'more hopeful of the "bad (178) lesions were operated upon after minor injuries with absent or minimal neurological signs and then the more severe penetrating wounds, in order of their severity were treated. Some observers (24 130 138) have pointed out that the purpose in the neurosurgical treatment of cranial wounds of war is not life saving but the prevention of infection in survivors of such wounds. The process of primary debridement, toward that end, which is usually per formed in the Evacuation Hospital is none the less associated with a significant mortality Secondary debridement at a General Hospital, again m survivors, is also attended by an oc casional death. Any evaluation must, therefore, be made only in consideration of the corresponding time and place relationships, and the type of cases selected for operation. This is strikingly true in a review of penetrating wounds of the brain in civilian life In this class, one-half of the patients who are brought to the hospital die within 6 hours of admission

Information is now available concerning the care of cranial wounds of World War H at Ameri-

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Second to seal sand	- 1 ush CB5	ualty angli found	a confre neur	open menthonemoses.

can evacuation hospitals and at British casualty ergrounds of scalp and skull. clearing stations or mobile field units Table IV summarizes reports which have appeared in the

The following patients with war wounds con adered in this review were observed by Webster recent literature Schneider and Loistrom after reaching a general hospital having in most instances been previ ously operated upon at evacuation hospitals. Most had survived their injuries and operation for from 5 to 10 days. There were 198 patients with penetration of the dura and brain and 62 with compound fractures in which the dura escaped penetration Forty German prisoners of war have not been included in the statistics ex cept in the summary of orbitocranial and cerebellar wounds There were 84 petients with wounds of the scalp requiring neurological observation The mortality was 6.4 per cent among 260 patients (Ital) 146 cases mortality 6 8% France, 114 cases, mortality 6 1%) The wounds were caused by shell fragments in 75 per cent of the patients and by bullets in 14 per cent in 11 per cent the cause was unknown A summary made in several groups and based upon the type of management required in treatment rather than upon the type of pathological damage pro-

Wounds of the scalp (84 cases - o dealks) The duced is given as follows patients in this group reached the general hospital usually because of a significant degree of per sistent headache which warranted further rest and Wound infection occurred in 15.4 per cent of these patients, which delayed early return to duty taken of 8 patients who presented symptoms and

was found It was not unusual for patients in this group to require neuropsychiatric attention their complaints being due to psychoneuroses.

Wounds without dural penetration (62 cases-I death) The dura was inspected at the time of the removal of the depressed bone fragments in all but II of this group of patients. Extradural hemorrhages were found in 3; and subdural hemorrhages in 2 1 of these patients manifested the complication by Jacksonian convulsions. Four patients presented major neurological disability in 3 of these the dura was observed to be normal. One patient died trephining being done at the time of failure. Autopsy showed that death was due to diffuse intracranial injury An encephaloque to uniuse musicamai minty fur encepumor graphic study was made of a patient in this group Trepanation at the site of a linear fracture was not routinely performed, although it was said to

Wounds with dural penetration (198 cases-16 be of value by Haynes (89)

deaths)

The management of wounds with varying degrees of dural and underlying cerebral injury followed in general the principles outlined in the operative technique of primary débridement previously considered Almost routinely a graft of

v	iously consider	77	1
	hone fragments	21	1
	Wounds with indriven tools Gutter type wounds Wounds with retained bone fragments Wounds with retained bone fragments what metal	76	3
1	2. Gutter typith retained	11	3
	1. Wouldes atal	8	- 5
d	Nous metal     Puri metal     Ventricular wounds     Perforating wounds     Venous sinus wounds (included in other groups)	r:	
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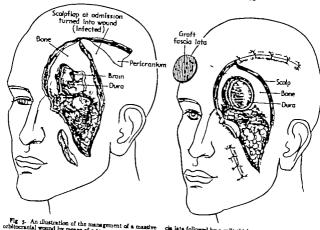


Fig 5. An illustration of the management of a massive orbitocranial wound by means of a temporary graft of fas-

cia lata followed by a split thickness graft to the defect.

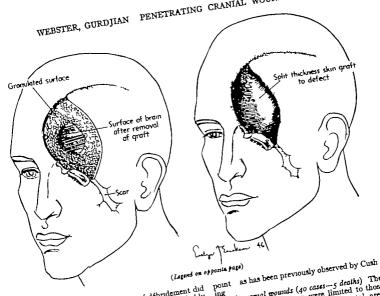
pericramium, temporal fascia or fascia lata was used to close the dural defect when necessary For example the dura was closed in all but 2 cases of the 50 cases in this group the condition in these 2 cases not permitting further expenditure of time at operation Among this group of 50 cases, a "preserved" dural graft was employed in 5 patients. The dura was obtained from cadavers and preserved in formalin and then alcohol (177) The observation of damming back of infection" when closure of the dura was employed, as re ported in World War I was not made

Patients with gutter type wounds almost uniformly sustained massive anatomical damage to the scalp skull, and brain This type of wound was less commonly observed, probably because of the fact that survivors were less frequent. The observation that the pathway for infection is maximum is supported by the fact that brain abscess developed in 9 patients of this group, an incidence of 43 per cent. The policy of tight closure of all wounds at primary debride ment regardless of the degree of infection con trary to that of World War I in which the wound

was left open for free drainage, appears to be well founded It is of interest that relaxing increons were not employed in the care of gutter wounds with major loss of scalp Closure was effected when mobilization of the scalp falled, by means of a flap swung into the craniotomy site, and a bare area of pericranium was left for grafting

The depth of track damage was usually greater upon penetration by a metallic missile. The potential contamination was also greater because of the fact that fragments, especially those larger than I centimeter bore organic material upon their surfaces. This was true particularly of ragged missiles in contrast to smooth bullets. Shell fragments may be covered with tiny bone particles adhering to the surface. The threat of later complications would appear to be considerable when such fragments are retained. A policy of removing all accessible metallic, as well as bone, fragments was followed when such missiles had not been removed at primary operation.

Survivors of wounds involving the ventricles were infrequently encountered. Contrary to the observation in World War I opening of the



ventricle per se in the course of debridement did not significantly increase the mortality probably because of the protection afforded by chemotherapeutic substances Control of infection was possible, even when the ventricle was entered in the course of débriding a complicating cerebral

Few patients with perforating wounds sur The principles in management were abscess. similar to those for the less severe penetrating injuries The wounds of ent, entrance and of the The dura was closed by means of grafts if necessary Only I patient entire track were debrided was found to survive a perforating injury involv ing both hemispheres which had been caused by a

Venous sinus wounds requiring heroic efforts directed at hemostasis ligation muscle grafts small shell fragment. and fibrin foam were sometimes encountered Adequate exposure was of importance Money (130) believes that the outlook for a return of cerebral function is bad when the sagittal sinus has been completely torn across and re qures ligation We have noted complete neurological recovery in ligations up to the rolandic

Orbitocranial wounds (40 cases - 5 deaths) The cases placed in this group were limited to those which involved the orbit and the frontal area of the skull and they were considered sepa of the skull and they were communicated in the special type of management of this often necessitated group of wounds has been reviewed in detail (111) The injuries of this type numbered 40 and were divided into two groups-Group I num bering 20 patients who presented severe destruc tive anatomic injuries to one or both globes in addition to the skull and brain injury Group II also numbering 20 patients, but these presented wounds which involved the orbit and brain with varying degrees of physiological injury to the contents of the orbit. Massive wounds involving the orbit and frontal area with associated injury to the paranasal sinuses could not be treated by conventional methods of debridement and closure because of the loss of tissue A suitable method for treating this type of injury was the employment creating this type of injury was the employment of a temporary graft of fascia lata to close the dural defect. The graft was removed after 15



Fig. 0 fan mane injury or the right fronts sobe. A sig-om, intracerebral clost, as removed from the missile track. The injury was caused by a broken off blade of an automothe fan connected to a 10 voit circuit and consequently

running at a much higher speed. There was no immediate tenance at a moon suggest specific and was no movement.

Appear are the microscoping and a four after the microscoping and a specific the microscoping and a s parameter devices became constone indostrative to cause of the enlarging blood clot in the unisale track (31).

days and a split thickness graft was then applied to the granulating area of involvement (Fig. Particular attention was given to the total de bridement of the sinuses by removal of all de vitalized tissue bone fragments, clots and sinus mucous membrane. mended radical debridement in wounds of the Schoratein (171) recomfronto-orbital region and the employment of a soft paraffin gaure pack in the open wound. A plaster-of-parts skull cap was then used as a rou tine dressing

An osteoplastic flap used for exposure of the frontal fossa was found to be of value in wounds with penetration produced by small metallic fragments which entered the orbital roof and the frontal lobe at the base of the skull. This exposure allowed debridement at the aite of the bony in jury and of the brain as well as the repair of the dura either by suture or graft. Distortion of the frontalarea through loss of bone was thus avoided. In 5 of the 40 cases in this group brain abscess developed an incidence of 12 5 per cent.

Wounds turning the corebellum (10 cases—1 It was observed that wounds of the cerebellum were infrequent. Ten cases (an incl dence of 3%) were encountered (213) War I reports indicate an even lower percentage of 54 (6 cases in 1 108)—(127) In 9 of the 10 pa of the cerebellum, and they were caused by shell fragments in all except 3 cases. In 3 instances the wound of entrance was located in the neck and the associated cerebellar injury escaped attention. The infrequency of cerebellar wounds is probably due to a low incidence of survival among patients with wounds involving the posterior portion of the

brain. Other factors probably include the protected anatomical location of the cerebellum and the adequate covering afforded by the steel helmet which was available in World War H. Thu type of injury, which presents the possibilities of rapid and serious complications, demands ex ploration as early as possible and is thus a probcm for the evacuation hospital neurosurgeon There was I death in this group of patients 8 presented minimal neurological defects.

### MILITARY CIVILIAN CORRELATIONS AND CONCLUSIONS

In civilian practice bullet wounds constitute at most all of the high velocity injuries in military experience only 15 per cent of cranlocerebral in-Juries were caused by bullets, as seen in a general hospital, and while wounding by shell fragments is unknown in civilian practice 75 per cent of the cranial cerebral wounds in war belonged in this class (210) The majority of bullet wounds in military practice are latal because of the velocitics and size of the missiles. Most bullets for was use are encased in a metallic casing and have a pointed nose A great many of the civilan bullets are round noted Frequent fragmentation and dispersion of fragments through the area of impact are common with the latter. In view of the lower velocities in civilian bullet wounding, radial acceleration about the track in the tissues is not as marked and therefore there is less pulping at a distance from the track.

Among the low velocity penetrating wounds of the head are perforation by knife blade car door handle golf stick, umbrella end, brick, and varione other everyday objects The management of

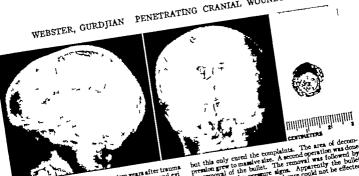


Fig. 7. Bullet would of head seen two years after traums for bedsaches. Examination showed cheked discs and evi denote of motor livitation in left lower limb Supported cyst amout butter was disproved by air encephanograms. The first operation consisted of decompression and tapping for a possible cyst. Decompression was thought sufficient

such wounds deserves only a passing comment Aside from the possibility of injury to the blood vessels with consequent formation of mass lessons (81) low velocity penetrating wounds of the brain do well under conservative management by careful debridement of the wound of entrance and inspection of the skull and durn. If the inagment is still in the cranni cavity it is removed. Obvi ously pulped and necrotic ussue is sucked away No extensive track debridement is necessary but with lacerations of the brain the possibility of intracerebral hemorrhage should be kept in mind The removal of large clots from the area of wounding may be lifesaving In Figure 6 are seen the x ray films of the skull of an adolescent youth A broken-off fan blade is seen in the right frontopanetal region near the midline. Although con sclous on admission within 2 hours he became semiconscious and before operation he was coma tose Following the removal of the fan blade a 22 gm. intracerebral clot was evacuated from the missile track. The patient awakened within a few minutes while on the operating table Usually low innuites while on the operating name on the low velocity penetrating wounds, if see in the low velocity penetrating to the careful observation for acute stage, do well, but careful observation for complications are complete and for homin absence to complete the careful observation of the complete the careful observation of the careful observation observation of the careful observation observation observation of the careful observation observa complicating meningitis and/or brain abscess is recommended. In the cases in which a patient is seen several months or years following a penetrat ing wound of the head with the foreign body still In the brain the fragments should be removed annce the possibility of eventual infection about the foreign body is ever present. Dretzka (56) une ioreign pody is ever present. The table (39) reports an instance of brain abscess about a broken knife blade in the left occipital lobe the

but this only cured the companies. The area of decompression grew to massive size. A second operation was done to removal of the builty. The removal was followed by the removal was a second operation. for removas or one pressure signs. Apparently the bullet summercine is the present ages. Apparently the other behaved like a brain tumor and cure could not be effected. without its removal (83)

injury having been sustained to years previously The abscess and the broken knife blade were removed and the patient recovered. There is no valid reason that easily accessible foreign bodies should not be removed even if they are asympto-

Penetrating craniocerebral wounds of civilians by bullet and low velocity missiles have been the besis for only a few articles since World War I matic. The reviews by Hanson (86 87), Pilcher (152) Walker (207) and the articles by Coleman (38), Goode (13) Gurdian and Buchstein (82) and German Hrody and Harvey (69) complete the American list. Goode (73) discusses the cases seen in the Cincinnati General Hospital Of 105 gun in the continuous of the head, 96 presented dural penetration and a mortality of 80 3 per cent resulted. All of 34 patients with perforating wounds died In 2 patients retained bullets caused no symptoms, for a 10 year period in one and an eight tients were operated upon with a mortality of 45 I een month period in the other per cent. Goode suggests exchang of the wound, of fragments of bone and of the foreign bodies if possible A fascia inta transplant is recommended for dural repair Gurdjian and Buchstein (82) reviewed cases of gunshot wounds of the head treated at the Detroit Receiving and Grace Hospitals. Of 45 patients 11 had no fracture of the skull while 34 had fracture of the skull and penetration of the dum or both Among the group with no fracture 1 had a left parietotemporal subdural hematoma Of the 34 with fracture of the skull and penetration of the dura or both 16



Fig. 8. This patient presented a cerebrospinal riboserbose associated with straingists, cortical attentions and as in location represents the straingist of conductivity of bridgement with elements of the straingist of conductivity of the straingist of careful state, which we present a few The core wound was subsequently covered with a solid thick case graft.

died in 9 hours or less and 5 deed in 26 hours or died in 9 hours or less and 5 deed in 20 hours or less. It was concluded that the state of consciousness is of prognostic significance in this class of ness is or programme argumentor in the case into three classes first, unconscious and moribund second, semiconscious and responsive to stimuli and, third, conscious. In the first group all died within a few hours after entrance into the hospital. The patients in the second group carried on long enough to develop evidences of increased intracranial pressure, hyperthermla, and hyper intracrama pressure, appearance of the pressure of the pressur puce. An initially low pulse have made belowed by a rapid; thready pulse. Five of this way in the pulse for any analysis of the animal pulse. group died in 20 hours or less after entrance 1 patient lingered on for 5 days, and the other re covered. Among 11 patients who were conscious on entrance 9 recovered and 2 dled 1 having re fused operation. These authors similarly suggest early operation for debudement removal of bone fragments pulped brain tiesue and metallic fragments if possible German, Brody and Harrey (69) review a group of compound cranlo-cerebral injuries. Of 64 patients, 9 had bullet wounds of the head, 6 died, 1 before operation. All traversing wounds terminated fatally

In the preparation of the present review no cases of dural penetration by bullets were no cases of dural penetration by bullets were not the complete for a period of a period of a great penetrational died of 3 deed in 20 years. Evident and a dural constitutional died of 3 deed in 20 years. Evident parameters of the state of the state of the proposatic important on from a to 44 days. The national died in the state of conscious temporation of the state of conscious many that it who survived from a to 4st days among the 1st who survived from a to 4st days and total debridement might have savel some lives.

In comparing military and civilian experience, civilian like from builter wounds of the head in civilian like from the first most civilian like from a pyalling. One reason for this the immediate input most civilian who survive death while in military practice compassible compassible from the first manufacture of the first military practice compassible compassible for the first military practice compassible compassible for the first military practice compassible for the first military practice.

lt appears that the proper mangement of it appears that the proper mangement of pentils and transportation of the proper mangement of the transportation of the proper mangement of the transportation of the proper operative intervention a partition of what could be accomplished with the transportation of the

agents to fight infection has undoubtedly been of careful derivations to the control of the cont

per Unless a patient with a bullet wound of the brain is in a moribund state on entrance, all effort ally brain is in a moribund state on entrance, all effort is considered by the should be made to give supportive and resultance of the statement. It is probably true that little can be accomplained for those who will diswithin a bullet true the statement of the bullet true, to remove a few hours of the injury. For some of those who ided close from the bullet true, to remove a few hours of the bullet true, the remove of careful and complete debudement cannot be completely all the sequence of the seque

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masse to expose the dural defect. Careful debridement of the dura, brain and the track are then carried out with the aid of suction electrocautery is used for hemostasia. The use of fibrin foam or cellulose cotton with thrombin may be indicated in some cases The dural defect is repaired with fascin lata or temporal fascia. The value of whole blood transfusions during the

operation cannot be overemphasized Metallic foreign bodies in the cranual cavity should be removed whenever possible. There is no reason for leaving them in the cranial cavity if they are easily accessible Foreign bodies which have lodged in the crantal cavity for many months or years, such as broken knile blades or ice picks, should be removed An maccessible bullet which may remain asymptomatic for many months or years may eventually cause symptoms necessi

There is a difference between civilian and militating operative removal (Fig. 7) tary forms of brain abscess. Simple drainage, of a brain abscess following a gunshot wound is seldom successful Excision of the abscess, frag ments of bone, hur and other foreign material is mandatory if a good result is expected Civilian abscesses can be drained with success (40 72 167 172) There is some evidence to show that late sequelae following crillian abscesses cured by drainage are fewer and less serious than those oc curring after the abscess has been excised or al lowed to extrude (42 74) However radical attack of cavillan brain abscesses is advocated by King (112 113) Kahn (111) Vincent (201 202) Pennybacker (148) and others. Vincent taps the abscess and later excises it like a deep seated ex panding lesson In dvillan practice the location of the abscess may be important for deciding on

Excision may be more seriously considered in the silent portions of the brain but if an abscess were located immediately beneath the motor centers drainage with cure may result in less disability In an earlier article on cerebrospinal fluid rhinorrhea due to traums the present authors (83) discussed the seriousness of cases with com plicating brain abscess and meningitis. Excision of the abscess in such a case and exposure of the fistula and repair (fascial transplant if necessary) can be entertained seriously in a manner described for military cranio-orbital wounds by Webster Schneider, and Lofstrom (210) (Fig. 8) With the aid of chemotherapeutic and biologic

the type of management (dramage or excision)

agents, early careful and complete débridement becomes a well established procedure in craniocerebral bullet wounds both to minimize post traumatic infection and occasionally to save life.

- I ACKLAND T H. Austral N Zealand J Surg., 1942
- 1 ACKLARD 1 IL AMERIL N LORIEM J SUITS, 194
  11 290-244 Brit. M J. 1917 3 42
  2 AMERIES J Internat. Librarch ser, 1895 1 201
  3 AMERIES J THE TRANSPORTER J TO 3. ANDREWS, E. Internat. Clin., 5th ser., 1895. I. 501. 4. Armarws, T. H. Pennsylvania Hosp. Rep., 1868.
- Ascumann, E. W. Canad, M. Ast. J., 1920, 10 718 Ascumann, H. Deut, Zachr ges. gerichti., 1933-34,
  - 6. ABNOID, II. DEUL LECHT SCB. SCHEERIN, 1935

    32 461 P. B. BRILBI, 1941 I 739.

    ASCROTT, B. Ment. Diss., 1940 1979.

    8. Idem. J. New Ment. Diss., 1940 90 74.

    10. BARNET C. JE. Surg Gyn. Chat., 1910, 31.

    10. BARNET R. Wire Nill. Wach., 1915, 28 355

    12. Idem. Altach. med. Wacht., 1918, 65 37

    12. Idem. Altach. med. Wacht., 1918, 65 37

    13. Idem. Altach. med. Wacht., 1918, 65 37

    14. Research. M. Rev chir., Far 1928, 65 376 abst.

  - 13. Ident. Silinen. ireu. (vaciir., 1910, 05 37 abstr., ]
    14. BERAUD, M. Rev chir., Par 1925 63 576 abstr., ]

  - 14 BERAUD, M. Rev chir, Par 1925 63 516 abstr., J. Am. M. Ass., 1926, 86 314. Apr., 1926, 86 314. Blues, M. N., BURNS, B. D., and ZUCKERMAN S. 15 BLUES, M. M. 1914; 8 827-874. MIL., 1918, 79 317. 16. BOWNERO, L. Arch. med. pharm. M. 1918, 79 317. abstr. Rev. neur., Par 1919, 26 339. abstr. Rev. neur., Par 1919, 26 339. ISSUE 17 BUTALIUS, L. De curandis vulneribus sciopettorum. 17 BUTALIUS, L. De curandis vulneribus sciopettorum.

    - 17 BOTALLEY, L. LE CUTEROUS TURETIONS ELOPETROTHE LYONS 1504. 18 BOYLEY SIE ANTHONY BRIL J SOTE, 1915-16, 3 451 19. BELNEY, ARNOLD. Canad M. Ass. J., 1945 53 584-
    - so. BECOTE, SEE BENJAMIN On injuries of the brain Section XI. Treatment of wounds of the brain and occusion of a requirement of womans of the Germand Its membranch. Med.-chir Tr., Vol. 14. Reprinted in the Works of Str Benjamin Collins Broduc col hetted and arranged by Charles Hawkins. London Longman, Green, Longman, Roberts and Green

      - Longman, Green, Longman, Roberts and Green
        18 Browner, 18 Str., 1943 62 3
        18 Browner, N. Macoor News, Feb. 37, 1943 Quot
        18 Browner, N. Macoor News, Feb. 37, 1943 Quot
        18 Browner, N. Macoor News, 183x E. N., and
        19 Brutza, E. G. Poeter W. World, 183x E. N., and
        19 Brutza, E. G. Poeter W. World, 183x E. N., and
        19 Brutza, F. H. J. Neuroper, 1945 2, 538-363.
        19 Canard, H. M. J., 1944, 13, 199
        19 Idem Proc. R. Soc. and 1944, 37, 37, 1945
        19 Canard, H. and 1944, 37, 37, 1945
        19 Canard, H. and 1944, 37, 37, 1945
        19 Canard, H. and Gurrander, Proc. R. Soc. M.
        19 Canard, H. and Gurrander, E. Bull. War Med.,
        19 Canard, H. and Gurrander, E. Bull. War Med.,
        19 Canard, H. and Gurrander, E. Bull. War Med.,
        19 Canard, H. and Gurrander, E. Bull. War Med.,
        19 Canard, H. and Gurrander, E. Bull. War Med.,
        19 Canard, H. and Gurrander, E. Bull. War Med.,
        19 Canard, H. and Gurrander, E. Bull. War Med.,
        19 Canard, H. and Gurrander, E. Bull. War Med.,
        19 Canard, H. and Gurrander, E. Bull. War Med.,
        19 Canard, H. and Gurrander, E. Bull. War Med.,
        19 Canard, H. and Gurrander, E. Bull. War Med.,
        19 Canard, H. and Gurrander, E. Bull. War Med.,
        19 Canard, H. and Gurrander, E. Bull. War Med.,
        19 Canard, H. and Gurrander, E. Bull. War Med.,
        19 Canard, H. and Gurrander, E. Bull. War Med.,
        19 Canard, H. and Gurrander, E. Bull. War Med.,
        19 Canard, H. and Gurrander, E. Bull. War Med.,
        19 Canard, H. and M. and M.

        - 79. CARRYS, 11. 2004 CONTRACTOR Chicagon, 1377-350.
          So. CALLEDOPA, G. R. and French, R. W. Mill Surgeon, 31. CALLEDOPA, G. R. and French, R. W.

        - 31 CALLESUICA, U. S. SEEN LEARNING TO THE TOTAL TOTAL TOTAL TO THE TOTAL TOTAL
        - 33 CASTIGLION ALLIANO, Chir, Paris, 1916, 43 1416
          34 CAMMAN C. De medicins, Book 8. Loeb Handeal
          35 CHANGA editin English transl. by W. G. Spencer
          Thraty editin English transl. by W. G. Spencer
          Campridge Mass. 3 vols. 1935;38.
        - Library edition English transl. by W G Spencer Cambridge, Mass. 1 vols. 1933-38.

          36. CALBROWS, B. J ARM. M. ARM. 1944. 18 507-270

          37. COLEMBA C. South SI J. 1944. 18 507-270

          38. COLEMBA F. A. J Internal Coll. Surgeons, 1944.

          7. 116.
        - 7 116 M Proc. Interst. Postgrad. M Ass. N
          - 40. CRAIN W 51 Froc. INICERS. FOREIGNESS AS America (1903) 1944, pp. 65. 41 Idem. Proc. Inst. M. Chicarago 1945, 15 293, 42 CONEMNO, G. M. Surgeon 1916, 38 601
          - 43 COSMING, C. PILL SUI SUISCON 1910 44. Idem. Brit. M J 1918, 1 221



Fig. 8. This patient presented a cerebrosphael rhinorrhes essociated with meningitis, cortical ulceration, and an infected wound. Management consisted of secondary dibeldement with closure of the dura by means of a temporary graft of fascia lata, which was removed later. The open wound was subsequently covered with split thick ness graft.

died in 9 hours or less and 5 died in 26 hours or less. It was concluded that the state of consciousness is of proguestic significance in this class of patient. These authors group their cases into three classes first, unconscious and moribund second, semiconscious and responsive to stimuli, and third, conscious. In the first group all died within a few hours after entrance into the hospital. The patients in the second group carried on long enough to develop evidences of increased intracrantal pressure, hyperthermia, and hyper pnes. An initially low pulse rate was usually followed by a rapid thready pulse. Five of this group died in 26 hours or less after entrance, 1 patient lingered on for 5 days, and the other re covered. Among 11 patients who were conscious on entrance o recovered and a died I having refused operation. These authors similarly suggest early operation for debridement-removal of bone fragments, pulped brain tissue, and metallic fragments if possible. German, Brody and Harvey (69) review a group of compound craniocerebral injuries. Of 64 patients, 9 had bullet wounds of the head 6 died, 1 before operation All traversing wounds terminated fatally

In the preparation of the present review roccases of dural penetration by bullets were reviewed from the records of the Receiving and Grace Hospitals for a period of 20 years. Eighty three patients deed 63 defed in less tian is boun, 9 additional died in 48 hours or less, and the reaining 11 carried on from 2 to 42 days. The prognostic importance of the state of consciounces was again evident. It seems fair to state that among the 11 who survived from 2 to 42 days, timely and total débridement might have saved some lives.

In companing military and civilian experiences, the mortality from bullet wounds of the head in civilian life seems appailing. One reason for this high mortality is that most civilians who survive the immediate injury reach a longituple before death, while in military practice comparable cases are seldom seen at an executation longitude because of the lack of equally rapid transportation

It appears that the proper management of penetrating wounds of the brain by high velocity missiles was well worked out at the conclusion of the last war on theoretical grounds. During World War II, with the help of better trained personnel and the necessary instruments for proper operative intervention a practical demon stration of what could be accomplished was given. A thorough debridement, removal of all foreign organic matter and removal of all pulped brain tissue was accomplished in many instances with no sequelae of infection weeks or months later. The use of chemotherapeutic or biologic agents to fight infection has undoubtedly been of inestimable value but they alone and without careful débridement would have falled. In the following few paragraphs the management of civilian craniocerebral bullet wounds is considered, as well as the lessons learned from war wounds which may be applicable to civilian nnctice.

Unless a patient with a bullet wound of the brain is in a morbund state on entrance, all effort should be made to give supportive and residualive treatment. It is probebly true that blut can be accomplished for those who will die within a few hours of the injury. For some of those who resuctiate, operative management to remove blood dots from the bullet track with careful dibridement may be lifeaving. The importance of careful and complete debridement cannot be overemphasized for upon it depends the prevention of late sequelae in the form of meningities and/or brain abscess. Long curved inclinea may be used to expose the skull defect, and the bone may be roughered away are there has removed en

masse to expose the dural defect. Careful debridement of the dura, brain and the track are then carried out with the aid of suction electrocautery is used for hemostasis. The use of fibrin foam or cellulose cotton with thrombin may be indicated in some cases. The dural defect is repaired with fascia lata or temporal fascia. The value of whole blood transfusions during the operation cannot be overemphasized

Metallic foreign bodies in the cranial cavity should be removed whenever possible. There is no reason for leaving them in the cranial cavity if they are easily accessible. Foreign bodies which have lodged in the cranial cavity for many months or years, such as broken knife blades or ice picks, should be removed. An maccessible bullet which may remain asymptomatic for many months or years may eventually cause symptoms necessi

tating operative removal (Fig 7)

There is a difference between civilian and military forms of brain abscess. Simple drainage of a brain abscess following a gunshot wound is seldom successful. Excusion of the abscess frag ments of bone, hair, and other foreign material is mandatory if a good result is expected Civilian abscesses can be drained with success (40 72 167 172) There is some evidence to show that late sequelae following civilian abscesses cured by drainage are fewer and less serious than those occurring after the abscess has been excised or allowed to extrude (42 74) However radical attack of civilian brain abscesses is advocated by King (112 113) Kahn (111) Vincent (201 202) Pennybacker (148) and others. Vincent taps the abscess and later excises it like a deep seated expanding leaon. In civilian practice the location of the abscess may be important for deciding on the type of management (drainage or excision) Excusion may be more semously considered in the silent portions of the brain, but if an abscess were located immediately beneath the motor centers, dramage with cure may result in less disability

In an earlier article on cerebrospinal fluid rhinorrhea due to trauma the present authors (83) discussed the seriousness of cases with complicating brain abscess and meningitis Excision of the abscess in such a case, and exposure of the fistula and repair (fascial transplant if necessary) can be entertained seriously in a manner de scribed for military cranio-orbital wounds by Webster Schneider and Loistrom (210) (Fig 8)

With the aid of chemotherapeutic and biologic agents early careful, and complete debridement becomes a well established procedure in cramocerebral bullet wounds both to minimize post traumatic infection and occasionally to save life.

### BIBLIOGRAPHY

- 1 ACKLAND, T. H. Austral, N. Zealand I. Surg. 1042.
- 11 230-234.

  2. AMDERSON, J. Brit. M. J., 1917 2 42

  3. AMDERSON, J. Brit. M. J., 1917 2 42

  4. AMDERSON, T. H. Pennsylvania Hosp. Rep., 1868 T1 48T
- c. ARCHIBAID, E. W. Canad. M. Ass. J., 1920, 10 778.
  ARMOID, H. Deut. Zachr ges. gerichtl., 1933-34.
- 23 46L 7 ARCROTT P B Brit. M. J., 1941 1 739. 8. Idem. J Nerv Ment. Dis., 1944, 99 74.

- 8. Idem. J. Nerv. Ment. Dis., 1944, 99 74-9. BACLEY C., Jr. Surg. Gyn. Obst., 1920, 31 449. 10. BARANY, R. Wien klin. Wachr., 1915 28 525.

- 11. BARANY, R. Wen Kin. Wakir., 1913 20 235.

  12. Idem. Belt klin. Chir., 1915 97 3907

  13. Idem. Minch. med. Wakir. 1918, 65 27

  14. BERAUD, M. Rev chir., Par 1915 63 576 abstr., J.

  Am. M. Ana., 1926, 85 314.

  15. BIACE, A. N. BURNS, B. D., and ZUCKERMAN S.

  Brit M. J., 1931 2 872-874.

  16. BORONO L. Arch. med. pharm. Mil., 1918, 70 217
- abstr., Rev neur., Par., 1919 26 239.

  17 BOTALLUS, L. De curandis vulneribus sclopettorum
- Lyons 1564.
- 18. BOWLEY SIR ANTHONY Brit. J Surg., 1915-16 3 451 19. BRANCH, ARNOLD. Canad. M. Asa. J., 1945 53 584-586.
- en. Brenntz, Str. Bentampr On injuries of the brain. Section XL Treatment of wounds of the brain and its membranes. Med.-chir Tr Vol. 14. Reprinted in the Works of Sir Benismin Collins Brodie col lected and arranged by Charles Hawkins. London
  - Longman, Green, Longman, Roberts and Green
- LORGINAN, Ureen, LORGINAN, Moderls and Green 1856; 3 76.

  31 BROWNER, J. Am. J. Surg., 1943; 62 3

  32 BUTLING, A. N. BIGGOW NOWN, Feb. 27, 1943; Quot ed by Calms, Brit. M. J., 1944; 1, 53.

  33 BUTLING, E. G. PUCKETT, W. O. HAMPY E. N. and McMillian, J. H. J. Neurosurg. 1945; 3, 558–563.

  44 CALING, E. W. S. Hiel, Chie., 1942; 2, 772.

- 25. Idem. Brit. M. J., 1944, 1 33
  26. Idem. Brit. Str. 1944, 1 33
  27. Idem. Proc. R. Soc. M., Lond. 1944, 37
  27. Idem. Proc. R. Soc. M., Lond. 1944, 37
  27. Idem. Proc. R. Soc. M., Lond. 1944, 37
  27. Idem. Proc. R. Soc. M., Lond. 1944, 37
  27. Idem. Proc. R. Soc. M., Lond. 1944, 37
  27. Idem. Proc. R. Soc. M., Lond. 1944, 37
  27. Idem. Id
- Lond., 1934, 27 1643-1668 pt. 2. 29. Carries, H., and Guttmann E. Bull. War Med.,
- Lond, 1943 3 477
  30. CALLENDER, G. R. War Med., Chic., 1943 3 337-350.
  31. CALLENDER, G. R. and FRENCE, R. W. Mill Surgeon,
- 1935, 77 177-101
  32. CAMPERLY, E. H., Jr. Ann. Surg., 1945 122 375
  33. CAMPERLY, E. H., Jr. Ann. Surg., 1945 122 375
- Knopf 1941
  34. Carantan, P. Bull. Soc. chir., Paris, 1916 42 1436
  35. Crams, A. C. De medicina, Book & Loeb Classical
- 35 CELEGO, A. C. De medicina, Book S. Loeb Classical, Library edition English transl. by W G Spencer Cambridge, Mass. 3 vols., 1035-38. 36. CLIMMONT, P. Verh. Deut. Ges. Chir., 1013, 42 a46 37 CLOWARD, R. B. J. Am. M. Ass., 1042, 118 207-270 38. COLEMAN. C. C. SOUTH M. J., 1024, 17 867 39. COLEMAN, F. A. J. Internat. Coll. Surgeons, 1944

- 40. CRAIG, W. M. Proc. Interst. Postgrad. M. Ass. N. America (1943) 1944, pp. 60.

  41. Idem. Proc. Inst. M Chicago 1945 15 22342. COLEMAN C. C. Arch. Surg. 1949, 15 100.

  43. COSERNO, H. Mill. Surgeon, 1910 38 601
- 44. Idem Brit. M J 1918, 1 221

45. CUMPRO, H. Brit. J Surg., 1918, 5 558. 46. DACOSTA, J C. N York M J 19 0, 92 845. 47. DAVID, M., et FERRY D Mem. Acad. chir Par 1040, 66 668.

7040 65 658.

DAYHOUT L. M. Hebrey M. J., N. Y. 1043 3 186.

40. De Marril, T. Ball. Soc. chir. Paris, 1914, 441 154.

50. Idem. Mem. Acad. chir. Paris, 1916, 441 154.

51. DEMOR, H. Studies in Military Surgery from Observations in the Italian Hospitals in 1839. Vol.;

General surgery of war wounds Vol.;

General surgery of war wounds Vol.;

Special surgery of gundot wounds. Quoted by Gross (86)

52. DEMORE, J. Wein, kin. Wecht. 1900, 33 13.

DEMORE, P. Ball. Soc. chir. Paris, 190, 43 25.

54. Idem. Bull. Soc. chir. Paris, 1907, 43.

54. DOTO: Bull. Soc. chir. Paris, 1907, 43.

55. DOTO. Bull. Soc. chir. Paris, 1907, 43.

56. DOTO: Bull. Soc. chir. Paris, 1907, 43.

57. DOTO: Bull. Soc. chir. Paris, 1907, 43.

58. DOTO: Bull. Soc.

54. Idem. Bull. Soc. chir Paris, 1804, 20 208.
55. Dovor Bull. Soc. chir Paris, 1804, 20 208.
56. DEFERA, L. Am. J. Surg., 1030, 8 8 9.
57. DUCUERO, J. D'HAROURE, J. GERMO, A., and

57 DUCULEO, J D'HARCOURE, FOLCH, A. Rev chir Par FOICH, A. Rev chir Par 939, 77 625 58. Enew K. Lancet, 943, 2 689 Brit. J Surg., 1944.

31 314.
59. ERRER, L. F., and SLACE, C. M. Elect. Engag., Chic.,

1041, 60 433-435. 60. EVERTE, W. H., and WOODERLI, B. J. Am. M. Am.,

61. EVERTS, W H., and Woomerall, B. Tr. Am. Neur

AMA, 044, 70 10.

62. FINCHER, E. F. South, M. J. 1041, 34, 1-8.

63. FRAHER, C. H., and Ingham S. D. Tr. Am. Neur

Ass., 019, p. 59. 64. FREY H., and SELYE, H. Wien, kiln. Wachr 19 5.

18. 63.9 and 72:
65. Futrow J F N England J M., 942, 220: 1-8.
66. Gaver G. Lyon chir., 19 5, 1 618.
67. Garmon, W C., and Gurwitz, J Ann. Surg 945.

68. GERMAN, W. J. Yale J. Biol., 1942, 14 453-462. 69. GERMAN, W. J. BRODY B. S., and HARVET S. C.

60. GERMAN, W J BRODY B S., and HARVET S. C.
SUTGET 1044, 6 37, 1000, 25 75.
70. GLLES, W A. Mill. Surgeom, 1000, 25 75.
71. GLARES, M A. Weet J Surg. 104, 40 610-627
71. GOODE, J V. Arch. Surg., 034, 89 15.
74. GRANT, F C. Surg. Oyn., 034, 89 15.
75. Idem. Surg. Clin. N. America, 104, 7 2 18.
75. Idem. Surg. Clin. N. America, 104, 2 633-635.
76. Idem. Pennylvania M. J., 103, 46 333-77.
GRANT. H. M. W N. YOK M J 918, 07 407 and

78. GROSS, G and HOUDARD, L. Bull. Soc. chir Paris,

70 1607 43 al. Soc. chir., 9 7 43 s188.
70 Gross, S. W. Am., J.M. Sc., 807 54 423.
8 Grangias, E. S. Soeth, Surgeon, 94 771-772.
83 Gonnian E. S., and Brounten, 41 Am. J. Sort, 33. GURDILAN, E. S., and WESSTER, J. E. Arch. Otol.,

944, 59 a87-yec.

84. Government, C. J. Surgey of the War in Portugal,
Spain, France, and the Netherlands. Philadelphia

Wundarmey gehoert, nach der neusten und besten

91 HELLER. Chirup, 1939, 1 705.
92. HERMEN Chirup, 1939, 1 705.
93. HERMEN J Frinciples of Military Surgery London.
Wilson and Black, 8 20.
93. HEWELT, P and LIBRAL, J A. Injuries of the HeadHodmes system of surgery Vol. 1, 2, 509, at Am. edfrom and Eng. ed. Philadelphia. Henry C. Lea' Some and Co., 1881 04. HIPPOCRATES. On injuries of the head, English

Art, grundlich abgehandelt und in vielen Karter taffein die neuerfundene und dienlichste Instramenten, nebst den begreemsten Handgriffen der chirungischen Operationen und Bandagen deutlich

vorgestellet worden. Nuremberg, 1719. The quots tions are from the London, 1745, translation of the Amsterdam Latin collition of 1710.

translation: The Genuine Works of Hippocrates, a vols. London: 849 (Francis Adams) Chap. 1

(Quoted by Mettler and Mettler [185])

95. Houses, System of Surgery (revised by Packard, J. H.) Philadelphia, Henry C. Lea's Son, 1831.

Pt. 4. Cumabot wounds. By T. Longmore (revised by Hunter McGuire)

by Hunter McGeire)

0. Hotsurs, G. Brit. M. J. 19 5, 21745.

97 Idem. Brain, Lond., 1917 49 451.

98 Hosan, G. Brit., 18 1919, 1919-80, 7110.

99 Idem. Canad. M. Am. J. 1949, 43 389.

10 Idem. M. Enghard J. M., 941 287 387-553.

1 Idem. Boll. Am. Coll. Surgeon, 948, 71187 31.

103. Hotsart, V. T. Am. Neur Am., 943, 69 11.

104. Idem. Brit. M. J. 1955, 1 381.

105. Hotsart, V. Chr. J. Lond., 1955, 12 361.

105. Hotsart, V. Chr. J. Lond., 1955, 12 361.

105. Hotsart, V. L. 1955, 1 381.

105. Hotsart, V. L. 1955, 1 381.

106. Hotsart, V. L. 1955, 1 381.

107. Hotsart, V. L. 1955, 1 381.

108. Hotsart, V. L. 1955, 1 381.

108. Hotsart, V. L. 1955, 1 381.

109. Hotsart, V. 1955, 1 381.

109. Hotsart, V.

Gunshot Wounds, 794. Republished by James Webster Phila., 1817 107 INTERALLIED SCHOICAL CONFERENCE Secondary and

Late Complications of Wounds of the Brain. Re-

Late Complications of Wounds of the Brain. Kernello, 1970.

105. [perfect editodally in Bett, M. J. 915, p. 105.]

106. [perfect editodally in Bett, M. J. 915, p. 105.]

107. [Perfect editodally in Perfect editodally edi

Lond., 044, 4 575 1 5. KWAM, S. T and CRAO, T C. Chin. M. J 1938,

116. LaPomera, A. J. Chir. Par. 9 5, 3 241.
117. LaPomera, A. J. Chir. Par. 9 5, 3 241.
117. Larva, D. J. B. Surgical Memorin of the Campaigns of Russis, Germany and France. Philadelphia. Carry and Lea, 1832. (Trans), from the French by Mercler).

Mercies).

1 S. Lazadoriano, V. T. Am. Neur Am., 943, 60; 77

9. Lisodoriano, V. T. Am. Neur Am., 943, 60; 77

9. Lisodoriano, V. A. Treatise on Military Surgery Vol. 8, p. 999, Paris J. B. Balliere et Fils, 180; Quotad by Gross (to.)

110. Lisodatoo, R. A. History of Surgery New York: Forben Press, 943, 11. Locawoon, A. L. Britt. M. J. 90, 11445; 2. Manzano, G. H. B. Notes on the Surgery of the Wer in the Crimess with Remarks on the Treatment of the New York: The Common Conference on the Surgery of the Wer in the Crimess with Remarks on the Treatment of the New York: The Common Conference of the New York: The Common Conference of the New York: The Common Conference of the New York: The New York: The Conference of the New York: The

Gurahot Wounds. Philadelphia: J B. Lippincott Co. 862

123. MATRIEU P Rev chir., Par 916, 31 666. 124. MAYPIELD, F H., and BELL, J C. South M. J

25. Medical and surgical history of the British Army which served in Turkey and the Crimea during the war against Russia in the years 1854-55-56. Par

liamentary Blue Book, 2 vols. 4to. Surgical Sec. tion Histories of Wounds and Injuries, Vol s

non instories of vocume and ingraes, val w p. 146, London 1855. Quoted by Gross (80) 126. Medical and surgical history of the War of the Rebellion (1801-05) Washington Govt. Printing Office, 1870-1833, Vol. 1 pt. 2, Surgery (Report on the extent and nature of the materials available for the preparation of a surgical history of the rebellion made to the Surgeon General, U.S. Army by George A. Otts, Circular No. 6, War Department, Surgeon General's Office, Washing ton, November 1 1865 pp 4-88)
127 Medical Department of the United States Army in the

World War (World War I) Vol. 11 pt. 1 General Surgery Orthopedic Surgery Neurosurgery Wash ington. Gov't. Printing Office, 1997 118. METTLER, C. C. and MITTLER, F. A. Trauma of

the Central Nervous System chap. z. Baltimore

Williams and Wilkins Co 1945

130. Monte R. A., and Netson T Y Ann. Surg 1943

131 Monte R. A., and Netson T Y Ann. Surg 1943

118 1

Monreover and County Arch med pharm mil., 1917, 66 790. Quoted by Newton and Brown (140)

133. MOZEIS, R. T. Nashvillo M. News, 1887 1 1 134. MOZEIS, W. H. Mil. Surgeon, 1916 38 131 135. MOGIONOUET A., and LEGRAINE, P. Bull. Bull. Soc.

Chir Paris, 1918, 44 966.
136. Movanow Personal communication, 1945
137 Neuroscrea, J. A Manual of Military Surgery Vol.
2, Special Division, chap. r. Quoted by Gross (80)

138. NEUBORF H. Ann. Surg., 1920, 72 550.
139. NEWTON A. Med. J. Australia, 1940, 7 22.
140. NEWTON A., and Brown A. E. Brit. J. Surg.,

1919-20, 7 72. О'Сомита, J E. A. Brit, J Surg., 1943 30 201

142. OLIVECRORA, H. Chirurg, 1940, 12 65.
143. PAPALLON Bull, Soc. chir Paris, 1894, 20 296. Quoted by Pilcher (153)

144. PARE, A. Ocuvres completes d Ambroise Pare J F
Malgaigne, 3 vols., 80 pp., Paris J B Ballieri
1940. Quoted by Mettler and Mettler (118)
145. PATTERSON G H. Bull. Los Angeles Neur Soc.,

1944, 9 106-111

146. PERPER, H. Deut, med. Wachr 1939, 65 1598. 147 PERFERIN, W and COSE, W Canad. M. Ass. J

1943, 48 99 145. PERRYEACKER, J C. Personal communication, 1945.

Mequignon, 1729.
150. PERLYS. Traumatic Injuries of the Brain and Its Membranes. New York D Appleton and Co., 1897 Quoted by Knaggs, R. L. Lancet, Lond.,

1906, r 581 151 PHERER, C. Lancet, Loud., 1906, r 581

132. Idem. Ann. Surg., 1936, 2 173. 133. Idem. J Nerv Ment. Dis., 1944, 99 71. 144. Idem. Proc. Inst. M Chicago, 1945, 15 214. 135. Pincocory N Elements of General Military Surgery Based upon Observations Made in the Crimean and Caucasian Wars, and Hospital Practice. 8 vol., 1168 pp Leipzig Vogel, 1864. Quoted by

Gross (8a) 150. Pous, A. Rev chir Paris, 1804, 14 274-318 and

645-730. 157 PORTER, C. A. Boston M & S. J., 1899, 140 835 158. RAND, C. W Bull. Los Angeles Neur Soc., 1944, g tot

150. RECARD G L. Rev neur., Par., 1919, 35 818.
160. RICHMOND, C. E. Brit, M J., 1881 1 596
161. ROBERTS, J. E. H. Brit, M J., 1915, 1 498.
163. ROCKES, L. Med. Press & Circ. London, 1943,

ROUVILLOIS. H Bull. Soc. chir Paris, 1918, 44 161

164. ROWBOTHAM, G. F. Med. Press & Circ., Lond., 1044. 100 74.
165 Rowe, S. N and TURNER, O A J Neurosurg.

1945 5 391 SACHS, E. Proc. Interst. Postgrad, M. Ass. N. Amer

Ica, 1943-43 p. 109-111
167 Idem. Proc. Inst. M. Chicago, 1945 15 238.
168. SAROEST, P. Brit. M. J. 1915, 2 747
169. SAROEST P. and HOLMER, G. Brit. M. J., 1915

17 S. Schorften, F. Arch. Neur Psychiat., Chc., 1941
172. Schorften, F. Arch. Neur Psychiat., Chc., 1941 45 392

SCHULZE, W and BETTERDANE, W Deut, mili-

thrand, 1949, 5 514-529.

174. SCHWARTZ, H. G. Personal Communication, 1944.

175. SCHWARTZ, H. G. and ROULHOC, G. E. Ann. Surg.,

1945, 121 139
176 Sixta N Chief Surgeon, U.S. Volunteers Medico-surgical Aspects of the Spanish American War

EMPIGIA ASPECTA OL INS SPRIBLIA INFORMATION VAIR Chicago. Am. M. Ass. Press, 1900. 177 SERMENTE Personal communication, 1944. 179. SERMEN, H. V. J. Neurouchir 1945, 7, 73 179. SORGO W. ZEL Neurochir 1945, 7, 73 180. SPICK and JAUKEUNDERENT BUILL Soc. chir Paris,

1918, 44 1980. STEINTHAL, K. Brit. M. J. 1916 1 895 STEINTHAL, K. and NAOEL, H. Beitr klin. Chir.,

1976, 137 361 1872. Ibid., 1988, 143 357 183. Strouter, L. "Maximen der Knegsbeilkunst" Klenige. Hannoverschen General-stabaarst fru herem Generalstarbaarst der Schleswig Holstem-ischen Armee 2 Abthellungen. Hannover 1855

Brit. & Foreign Med. Chir Rev 1856, 17 65-84.
184. STUBERSOND W. Brooklyn M. J. 1896, 10 337
185. STUCK, R. M. Rocky Mountain M. J., 1941, 38 703.
186. Symposium. Clinical Cases of Shell Wounds of the

Head Brain, 1919, 42 340.

187 TABUTEAU, G G Brit. M J 1915 2 501.

188 TERRAN, K. G Problemy Neyrokhirungh, Moscos (In Russian) 1943, 7 24-30. Abstract, Bull. War Med., Lord., 1944, 5; 9.
189. Trakan. Brit. M. J., 1915 2 190.
190. Toxicis W. Beltr kim. Chir., 1939, 170 581

191. Idem. Deut. Med. Wachr 1040, 66 57 Abstract,

Lancet, Lond., 1940, z 379.
102. Toursant M. H. Bull. Soc. Chir Paris, 1907 55:

193 Towne, E. B., and GORTHALS, T R. Ann. Surg

1920, 71 531 194. TRIFLER, C. S., and BLACKMAN, G. C. Handbook

for the Military Surgeon. Cincinnati: Robert Clarke and Co., 1861.

195 TROTTER, W and WAGSTAFFE, W W Gurshot wounds of the head, In "History of the Great War" Medical Services. Surgery of the War Vol. II, Chap r p r. London His Majesty's

106. TOPERER, D. Surg., Gyn. Obst., 1015 21: 278.
196. TOPERER, M. Surg., Gyn. Obst., 1015 21: 278.
195. TOPERER, O. A. Mill. Surgeon, 1943, 92 473.

- 00. VELTES, E. Pinies Penetrantes du Crane par Projec tiles de Guerre. Paris A. Maloine et Fils, 1917 Quoted by Towne and Goethals (194)
- 200. VILLARUNE, C. Corps etranger Metalliques intracraniens toleres en apparence, J med. chir prat., 1917 p. 133. Abstract, Roy neur Par., 19 7 a41 550.
- sol. VINCENT, C. Gas. med. France, 1036, 43 03-06.
- son Idem Mem Acad chir, Par 939, 65 034. son Von Bergmann, E. Durch Ronigen-Struhlen in
- Him nachgewiesene Kugeh. Berl. klin Wuchr 1898, 35 389. 204. Von Emunskan, A. Gehirnschusse, Munch. med. Wuchr 19 6, 63 738 reviewed in Brit. M. J
- 1916, 1 895. 205. Von Manteuverel, Z. Verh. Deut. Ges. Chir 006.

- SS 495-100.

  SS 495-100.

  WARPLAFFE, W. W. Lancet, Lond., 1928, 2 801.

  SO WARPLAFE, A. E. War Med., Chle., 1948, 21 454.

  SO. WATT and ALPHANITE. Lancet, Lond., 948, 493.

  SO. WIRSTER, J. E., and GURDHAW E. S. J. Neurophysiol., 943 6 245.

- sto. Wenters, J. E., Schweider, R. S., and Lorence, J. E. Observations of Early Brain Abscess. In Press.
- arr. Idem. Observations upon the Management of Orbitocranial Wounds. (To be published.) 212 Idem. Observations on the Management of Cere
- bellar Wounda. (To be published.)

  2 3. Wams and Gaosa, J. Rev. neur. Par. 1915, 22 935

  214. Wakarosi, H. R. Phila. Med. Times, 1878–1870.
- 9 493
- 215 WHITAKER, R. Brit. J Surg., 9 5 16, 3 708.

  O WILLEMAN, C. Bulletin Soc. chir Paris, 918, 44
- 217 WILLAMSON, G Military Surgery 8 vol., 55 pp. Lundon. John Churchill & Sons, 1863. Quoted by
- Gross (80) 8. Without, L. B. Mill, Surgeon, 192 49 447-251.

  10. Idem. Firearms and projection their bearing on wound production. In "The Medical Department of the United States Army in the World War
- Washington Gov't. Printing Office, 927 9-56 20. ZOCKERNAN S. Brit. M. I 1040

# ABSTRACTS OF CURRENT LITERATURE

# SURGERY OF THE HEAD AND NECK

### HEAD

Lubschitz, K. Adamantinomas of the Jaw with Reference Especially to Their Treatment 4.63 Radiol., Stockh. 1945 26 441

Adamantinomas are epithelial tumors which occur chiefly in bones and especially in the laws the lower law being affected more frequently than the upper Though the tumor is benign histologically it often proves clinically malignant, because of its particular features. It may recur despite repeated surgical intervention and may be responsible for a fatal

In the jaw at least adamantinomas occur a little more frequently in women than in men Most often the tumor develops between the ages of 20 and 40 years but it has been found as early as at birth and as late as at the 76th year of age. Its growth is slow and in the beginning it does not give rise to symptoms but as it increases in size it causes the bone in which it is situated to expand This first interferes with chewing later, deglutition and respiration may become difficult there may be pain and hemor rhages, perhaps spontaneous fructure. Owing to the slow growth however it may often be several years before the symptoms become so marked that the patient finds it necessary to consult a physician.

Morphologically, two forms of adamantinoma may be distinguished solid and polycystic. The former is the rarest. The etiological connection be tween the adamantinoma and the enamel organ is shown by the similarity of the microscopic structure

Operative removal of the tumor has been practiced ever since its nature was recognized enucleation cauterization, and resection of the por tion of bone containing it are mentioned in the

The author gives an account of 11 cases of the disease. The patients were treated at the Radium literature Center in Copenhagen, during the period from 1932 to 1943 Seven of the patients were males and 4 were females. In 7 patients the tumor was situated in the upper jaw and in 4 the lower jaw Eight of the tumors were cystic, 3 were solid the latter oc curred in the 3 youngest of the patients

The roentgen examination is an important aid in the diagnosis, which especially in tumors of the lower naw may often be established with consider able certainty on the basis of the roentgenologic picture. In the film the tumor appears as a well deined rarefaction or as several more or less confluent rerefactions, which often cause expansion of the bone. In the upper law the picture is less charac terratic, the tumor often (at least in the beginning) shows itself only by a blurring of the maxillary sinus

sometimes by an expansion of the latter and only after some time do also signs of destruction of the bone appear Only the histological examination, after biopsy or operation, makes the diagnosis absolutely

The author discusses the therapeutic results and stresses the clinical malignancy of the tumors, as contrasted with their histological benignity She points out that the clinically malignant character of adamantinomas makes complete primary removal important—in the case of solid adamantinomas by enucleation, and in the case of cystic adamanti nomas by resection. Roentgen treatment can only be used as a palliative measure JOSEPH K. NARAT M.D.

### EYE

Kekcheer K. K.: Methods of Accelerating Dark Adaptation and Improving Night Vision Wer

The author discusses methods of accelerating the dark adaptation of the eye with the view of im proving night vision. Methods include (1) regu lating the adaptation before passing into darkness (2) wearing goggles with colored lenses (3) exposing the eyes to white light (4) exposing the eyes to red light and (5) employing gustatory and olfactory simuli. These methods are not equally valuable. The choice of method used depends on the circum stances at the time of adaptation. HUNTER H. ROMADIE, M.D.

Hardy L. H., Rand G., and Rittler M C.: Tests for the Detection and Analysis of Color Blind tor the Detection and Analysis of Color Blind ness) An Evaluation of the Ishihara Test Arck.

In this article the author and his coworkers evaluate the Ishihara test. They believe that the test is a gross one for defective red and green vision but falls to classify the type of color vision. For this reason it cannot be used to give a satisfactory evalu ation no matter how carefully it is administered HUNTER H. ROMAINE, M.D.

Shapland, C. D : Two Cases Showing Unusual Intraocular Foreign Bodies. Proc. R. Soc. M. Lond., 1945 38 663.

In this article the author describes 2 unusual cases of intraocular foreign bodies one of which showed the possibility of the retention of nonmagnetic metallic fragments in the eye for five years with no evidence of inflammatory complications and no evi dence of degeneration from chemical action. In the second case the eye retained multiple particles of stone without evidence of pyogenic infection. The absence of this infection apparently is due to sterl lization of the particles by the heat resulting from the explosion at the time of the accident. HUNTER H. ROMAINE, M.D.

Struble, G C. and Kreit, A. J : War Injuries of the Eyes and Visiral Pathways. War Med., Chic.,

The authors discuss the factors leading to eye injuries in warfare and the type of injuries sustained and illustrate the various forms encountered. They and musicate the various joints theoretical mannote that serious lealons of the eyes, including mac ular disturbances, may be caused by blast concustion alone, without any penetrating injury Penetration of the orbit by minute shrapnel fragments which do not penetrate the goods may also cause exhibit do not penetrate the goods may also cause serious intraocular damage. No cases of ocular injury following severe war traumas of the mandible were encountered and the authors believe it possible that the temporomandibular joint may absorb some of the concussion. Severe unlateral facial wounds have resulted in damage to the eye of the same skie,

All persons who have been exposed to a severe but never the opposite eye. blast or who have incurred war wounds about the head should have a thorough eye eramination, esnean anough have a thorough type transmission, especially as to fundl and visual fields. There should also be a complete roentgenological examination of the skull, the facial bones, both orbits and the optic forming for evidence of fracture or foreign body WILLIAM A. MARN M.D.

Devoe, A. G | Surgery of the Anophthalmic Orbit. Am. J Ophik., 1945, 18 1346.

An opportunity to see a large number of anophthaimic sockets in military service has resulted in an analysis of some of the difficulties encountered in the use of a properly fitting prosthesis. The commonest single cosmetic blemish seems to be the retraction or sinking of the upper lid with loss of the normal lid crease. This may be due to a change in the normal direction of pull of the levator to loss of orbital theme, to atrophy of the orbital fat, to overlapping of the muscles over an implant with the levator pulled down by the superior rectus, or to use of a large implant, as has been suggested by various authors. It is difficult to overcome this by changing the shape or size of the artificial eye. Attempts to overcome this difficulty have been attempted by (a) severing the attachments of the superior rectus and the levator at the time of enucleation, (b) delayed implantation of a glass sphere, (c) implanta tion of cartilage on the floor of the orbit, and (d)

The results of the first method are inconclusive. dermal graft to the upper lid. As to the second method, it is often difficult to find Tenon a capsule for delayed implantation, especially i enon a capsuse nos ucasyco unpastrazion, capecani, under general anesthesia, and in general this method was found unsatisfactory. If there is a de-method was found unsatisfactory. pression of the floor of the orbit, carrilage may be The author has had implanted subperiosteally

good success with dermal grafts in these cases good success with dermai grants in the high and Thick akin from the back is implanted high and superficially beneath the skin of the upper lid, using

The next most common defect is one which usually occurs after an artificial eye has been worn for many two layers. years there is difficulty in retention of the eye doe to a relaxation of the orbicularia. An operation simflar to Wheeler's method for shortening the orbicshad to window a memory for secretaring one whose larls in spastic entropion may be performed, and the author used this method in 4 cases, with success in 2 In the s cases in which this operation was not see cessful, the defect was corrected by the use of a mucous membrane graft after dissection of the con

functival surface below the tarsus. The author believes that the use of skin grafts in the socket should be avoided because of the resulting discharge and odor especially where both skin and

The surgical procedures described should be used mucous membrane are present. only after all attempts to correct the defect with a properly fitting eye have failed

WILLIAM A. MARR M.D.

Record A. B.: The Iridencieles Operation for Glaucoma. Arca. Ophila., Chic., 1945: 34 350.

Of 61 eyes upon which the author performed an iridencies operation for placeoms, the disease was arrested in 5s and in 9 the results were considered unsatisfactory Failure in a cases was believed to be due to a poorly placed incusion in the remaining? the patients had undergone previous trephine opera tions or had shown used pathology and were therefore unsultable for this method of surgery

The author emphasizes the importance of making the kerstome inclaion in the sciers a mm. behind the limbus, and producing an iridodislysis, feaving both iris pillars incarcerated, which suggests some variance in technique from that which is usually enployed. He prefers to inche the conjunctive with the keratome 10 mm from the limbus dragging it down to the point of incision in the sclera rather than to make a clean dissection down to the sclera before

It is emphasized as has been brought out by inserting the instrument. others, that this operation is most useful in cases in which the intracular tension is not too high-pref erably under so mm. Hg. (Schlotz) It is not indicated in cases of long standing, in aphacia, or in cases in which previous operations for glaucoma have

The author has encountered no serious complica tions with the operation, and has thus far observed been unsuccessful. no instance of sympathetic ophthalmia following it.

Muldoon, W. E.; Restoration of Patency of the Nasotacrimal Duct. Am. J. Ophib. 1945, 38 1340.

The author has placed vitallium tubes into the nasolarrimal duct in 4 cases of stenoris of the duct with a fairly good end-result in at least 3 of the cases. The principal advantage of vitalihim is its lack of tissue reaction the metal may be left in position permanently, and for this reason it has had widespread use, especially in orthopedic surgery Doberty first reported its use in ophthalmology as

The author exposed the lacrimal sac by a 13 mm an orbital implant. curved skin incision and through a small incision in the sac curetted the nasolacrimal duct and then placed the vitallium tube into the bony canal with the shoulder resting on the ram of the canal The in culon in the sac was closed with ooo plain catgut and the skin and subcutaneous tissues were su tured in the usual manner A pressure bandage was applied for several days, and the canal irrigated through the upper or lower punctum one or two

It was found that in most cases a tube 3 mm in weeks later diameter could be inserted without difficulty Because the metal is extremely hard it must be cast and therefore the walls cannot be less than o 5 mm in diameter This inside diameter of 2 mm seems to be adequate for drainage. The length of the tube is 18 mm., which the author believes to be desirable. In one case, a tube 2 mm in diameter was used leaving a lumen of only 1 mm which does not seem

The author points out the advantages of this proto be adequate cedure over a dacryocystorhinostomy and the im provement reported in his cases would seem to ray films of justify further use of this method the tube in position are reproduced

WILLIAM A MARR M.D.

### Reis, J Lat A Corneal Graft Operation for Recurrent Pterygium Bril. J Ophik 1945 29 637

The author describes a corneal graft which he uses in association with pteryglum operations in order to prevent the postoperative cleatrical opecity with subsequent vascularization which occurs following the general surgical procedure. He believes that the optical and coametic results are better and that there is less likelihood of recurrence. The technique is plainly described

### Krause, A. C.: Congenital Cataracts following Ru bells in Pregnancy Ann Surg 1945, 122 1049-

The author reports 5 cases of congenital cataract which followed rubella in pregnancy, and discusses the preventive, conservative and radical treatment

In Australia an unusual number of congenital of fetal rubella. nuclear bilateral cataracts appeared as a mild epidemic in infants. Damage to the lens evidently occurred during the first lew months of pregnancy in mothers who acquired German measles during the second or third month of pregnancy The cataracts were associated with many other congenital defects. Mental retardation occurred in 4 infants congenital deaf mutism in II and heart lesions in 21

In a series of 124 cases reported in the literature in which pregnant women were diagnosed as having rubella, 96 infants had cataracts.

In view of the seriousness of the complications therapeutic abortion should be considered if the disease has occurred in the first 4 months of preg Treatment with convelescent serum should also be considered Krause stresses the importance of early surgical treatment of the cataract before the ability to develop firstion is lost this would be before the age of 3 months JOSHUA ZUCKERMAN M.D.

### Scholz, R. O.: Epirascular Choroldal Plament Streaks, Their Pathology and Possible Prog. nostic Significance Bull Johns Hopkins Hosp.,

The author describes 5 cases of epivascular choroidal pigment streaks, rosary streaks of Siegrist, and reviews the literature on this subject

The majority of the patients considered had by pertensive cardiovascular disease and in some of them renst involvement was indicated It was possible to follow up the study in I Instance with autopsy findings. Anatomical reconstruction indi cates that the ophthalmoscopic picture is produced by proliferation of the epithelium over partially sclerosed choroidal arteries. It is suggested that the presence of these streaks is of prognostic value, and in the majority of cases a poor prognosis is indicated

### Rodin F H: Hypertensive Retinopathy Assodated with Adrenal Medulary Tumor (Pheo-chromocytoma): A New Clinical Entity Arch.

Ophik., Chic., 1945 34 402

Pheochromocytoms is a rare form of chromaffin tumor arising from the embryonic sympathetic nervous system. The adrenal medulla is composed of chromaffin cell tissue hyperplasts of which is con sidered the rarest form of adrenal tumor. It is char actenzed by a train of hypertensive changes, in cluding definite ocular changes Epinephrine or an epinephrinelike pressor substance is contained in the cells of the tumor This substance freed in the bloodstream causes vasoconstriction elevation of the blood pressure and stimulation of the sympa thetic nervous system. In the eye there is a typical In a case reported by the author there was an ex hypertensive retinopathy

tensive retinopathy of a hypertensive type with hemorrhage and exudates. These findings disaphemorrhage and exudates. These findings disappeared following removal of the tumor Serial fun dus photographs illustrate the findings in the eyes prior to and after removal of the pheochromocytoma The author believes that this is a new clinical

entity which should be called a hypertensive reti nopathy associated with adrenal tumor WILLIAM A. MARK M.D.

Bedell A. J : Clinical Differentiation of Emboli in the Ratinal Arteries from Endarteritis. Arch. Ophi Chic, 1945 34 311

The author describes a means of differentiating emboli in the retinal arterial system from endar teritis. In cases of embolism the arteries become mere threads and are greatly reduced in size, whereas in endarteritis the arteries are not as small as those found in embolism. In addition, in the latter case tound in emission. In airmoon, in the battle care always white plaques along the walls of the vessel. In embolism the retinal edema is limited to an oval area which includes the disc and macula an over more much medical the edema usually involves the entire visible fundus. In cases of endarteritis there is always some evidence of pre-existing arterial disis aways some evenence of pre-caseing access usof vessel caliber indentation of the veins and exudates, hemorrhages, or other signs of arterioscie-HUNTER H. ROMADIE, M.D. rosis and hypertension.

Henry G A.1 Blast Injuries of the Ear Larysts

In this article are presented the findings and impressions gathered from \$92 men sustaining blast ear Injuries. These cases were seen during the Battle of Europe at a large hospital part time under canvas and later in buildings. They came chiefly from in

Tinnitus was the most common and by far the fantry and armored units. most persistent of the symptoms It occurred in one ear in 124 patients and in both ears in 48. Usually it lasted for from only a few days to a month, but in a large minority it persisted continuously for from a few months to a year Vertigo was not a prominent symptom. A few of the men stated that they found blood in their ears shortly after the blast many more found a slight discharge a day or two later. On cramination however it was surprising to find how few had evidence of blood in the canal or middle car

Headache of the usual frontal parietal, or occipital variety was occasionally a complaint, but it did not occur more frequently in this group than in a similar number of soldlers without blast ear injuries one hundred and fifty two patients suffered per foration of the car drum, 114 had a single perforation of 1 cardrum 13 a double perforation of 1 drum and so had a single perforation in both tympanic mem branes. Hemorrhagic areas of the drum were present oranes. In 36 cases. External of the was present in rear canal

20 times, and in both ears 22 times. In the beginning nearly all cases had a combin ation of conductive and perceptive deafness. The greatest hearing improvement occurred in the first 10 days most of this in the first 4 days. The majority of cases continued to show improvement in perceptive hearing a few showed gradual deterioration.

It seemed likely to the author that about twothirds of the men would recover completely Others would unquestionably be inconvenienced by loss of womes unquestrousers to monovemental by was unbearing in one car and a smaller group would require the help of a hearing ski Unfortunately a few will the help or a negating any unnorthing that they will require have so much loss of hearing that they will require NOAE D FARRICANT M.D. instruction in lip reading

Struble, G. C.: Penkcillin Therapy in the Practice of Otologympology Arch. Older Chic., 1945 41

The parenteral methods used for the administra tion of penicillin consisted of intravenous drip for the first 24 or 48 hours in the most severe infections, followed by intramuscular infections every 3 hours.

Local methods of application consisted of the in-stillation of isotonic sodium chloride solution contains aumation on personse assignmentation seement containing a 500 units of penicillin per I C.c. into the sinuse ing 2 300 units to perform per and the paranase ears, and mastold cavities the filling of the paranase cars, and mastold cavities the filling of the paranase cars, and mastold cavities the filling of the paranase cars, and mastold cavities the filling of the paranase cars, and mastold cavities the filling of the paranase cars, and mastold cavities the filling of the paranase cars, and mastold cavities the filling of the paranase cars, and mastold cavities the filling of the paranase cars, and mastold cavities the filling of the paranase cars, and mastold cavities the filling of the paranase cars, and mastold cavities the filling of the paranase cars, and mastold cavities the filling of the paranase cars, and mastold cavities the filling of the paranase cars, and mastold cavities the filling of the paranase cars, and mastold cavities the filling of the paranase cars, and mastold cavities the filling of the paranase cars, and mastold cavities the filling of the paranase cars, and mastold cavities the filling of the paranase cars, and the paran almoses with 1/2 per cent of ephedrin sulfate in isanusca with 72 per tent or containing so units of penicillin per cubic centimeter, and the durting of

postoperative mastoid wounds with 100,000 units of

The following opinions were expressed, supported by illustrative cases. Parenteral penicillin therapy has a favorable effect in acute simuits but is not effective after acute and chronic empyema is present. Local therapy shows great promise in the emprema of sinuses. Penicillin therapy is effective in early stages of otitis media, but must be given in adequate

Supporation in the mastold or petrous pyramid does over a long period may be incompletely controlled (masked) and came complications after withdrawal of the drug unless surgical drainage is instituted Sulfonamide and penicillin therapy should be combined when intra

In chronic otitis media without cholestestoms or cranial extension is suspected granulations and with a large perforation, penicillifiven locally was sometimes useful in controlling

In cases of superficial cellulitis in deep infections involving the retropharyngeal, submarillary and local infection. perspharyngeal spaces and in Indwigs angus, perspharyngeal spaces and in Indwigs angus, peniallila was found to be more effective than subformulate in controlling the spread, but since invariably surgical drainage was also required. Penfefilin like sulfonamide compounds, can give an effect masking the presence of disease unless the physician is alert to this possibility principles and indications for surgical drainage re-

Lindsay J R.: Osteomyelith of the Petrous Pyra mid of the Temporal Bone. Ags. Surg. 945.

Lindsay states that the middle car air spaces separate the marrow spaces of the bones of the vanit from the petrous pyramid and other bones of the

Infection passes readily from marrow spaces to sir cells, but extension in the reverse direction meets base of the skull. ceus, out extension in the reverse direction meets greater resistance. The cell system, therefore, tends to limit the spread of esteomyelitis between the

vault and the base of the skull.

Ostcomyclitis of the petrous pyramid sometimes occurs by the hematogenous routs or by extension from our the nematogenous routs or by excession from other bones of the skull base, but it is arreally a direct extension from middle car suppuration.

The dense labyrinthine capsule forms a barrier between the marrow-containing apex and the middle ear cell system in the majority of bones. In about 20 per cent of bones, however the air cell system in yades the apex and creates a direct entrance for infection and the possibility of osteomyelitis.

A tendency to obstruction of drainage created by a natural bottleneck, predisposes to the breakdown of cell partitions and invasion of surrounding mar

Ostcomyellus tends to remain localized within the apex during the acute stages and responds well to row spaces in the apex. surgical drainage

Chemotherapy provides a valuable aid in localiza tion but cannot be depended upon to cure without

In the presence of sequestration or extension of the esteomyelitis to other bones of the base of the surgical drainage. skull, the combination of chemothers py and surgical drainage offers a means of avoiding dangerous com plications, but may fall to eradicate the disease.

### NOSE AND SINUSES

Lumsden R. B.; War Wounds and Injuries In volving the Paranasal Sinuses. Edinburgh M J.,

Twenty cases of wounds or injuries involving the In 9 of these the frontal or frontoethmoidal region paranasal air sinuses are recorded was involved while involvement of the maxillary or

marilloethmoidal region occurred in 11 cases. The late operative procedures are described and JOHN F DELFH, M.D. technical points are discussed

### MOUTH

Parker D B.: Observations on the Definitive Treat ment of Maxillofacial Injuries. J Oral Surg

In examining and reviewing a large number of naxillofaccal gunshot injuries or injuries from conact with high explosive missiles in the military hospitals designated as plastic marillofacial centers one recognizes certain definite facts. The first observa tion is in great contrast to the observation of World War I in that the incidence of infection of the soft tissues and bone is much lower Two or three months after injury we find comparatively few cases of osteonyclitis or necrosis involving the bones of the face and jaws. This is unquestionably the face and jaws. The is unquestionably the state of early intelligent treatment in the forward treatment of the state The training of medical and dental officers in mavillofacial surgery and the assignment of these officers to teams working with the auxiliary surgical groups have certainly borne fruit in the better con dition of the wounds when these patients have been evacuated to the United States for intermediate or definitive treatment The second observation is that there has been a much more intelligent effort to

stabilize the bones of the face and jaws in a more nearly normal, anatomic relationship alded in avoiding the deformities resulting from collapse of the bony supporting structures of the face often difficult to overcome in the definitive Wiring techniques have been accepted as an aid in primary treatment in the overseas treatment

The medical officer has learned that the dentist is essential to the ultimate treatment of the maxillotheaters facial injury just as the dentist realises that the plastic surgeon is essential to completion of many of the oral operations and the cases as a whole Mutual understanding as to the part that each should play and a knowledge of the ultimate requirements in function and appearance, have made the plastic maxillofacial services function to the ultimate ad

When there is a loss of bone in the mandible an vantage of the patient. adequate soft tissue bed in which a bone graft will eventually be placed is essential An attempt to insert a bone graft in tense adherent cicatricial ussue will often result in failure. Such tissue should be replaced by tissue having a good circulatory bed and loose enough to accommodate a graft without pres sure sufficient to alter its contour Bony support sufficient to withstand masticatory pressure or to aid in the retention of a prostitute appliance is desirable for much of the hat surface plastic repair of the face is complete Bone grafts in areas commun cating with the mouth or in which residual infection persists (in the bed or adjoining lost bone) are of course doomed to failure although, with penicillin therapy, some of the implanted bone cells may

One of the most difficult problems attending the definitive treatment of maxillofacial injuries caused eventually survive. by penetrating missiles is the trismus resulting from the wounds adjacent to the coronoid sysomatic temporal area. The marked destruction of the tem poral and massecter muscles as well as of the buc chator muscle, results in a dense fibrosis in this area, which either limits or obliterates altogether the masticatory function of the mandible. Attention should be given both to preventing the maximum amount of fibrosis and to correcting functional dis

Another problem in the definitive treatment of maxillofacial injuries is that of adhesion of the buccal nucous membrane to the alveolar ridge of the mandible or of the maxilla, which obliterates par tially or entirely the vestibule of the mouth Such a deformity limits the motion of the lips or of the buccal muscles which results in limited motion of the facial muscles of expression. It also limits the abilityof a patient to wear a prosthetic appliance to assist or a particular to wear a prostucture appropriate to assist in functional mastication, or for cosmetic use, to improve the contour of the face. Such conditions can be treated only by deep incisions through the adherent clearry and the interposition of a split graft over a stent mold held rigidly in position LOUIS T HYAR M D

Cook, T J Royster H. P and Kirby C. K.: The Treatment of Gunshot Fractures of the Man dible. J Orel Surg. 1945, 3 320

Certain essential steps should be followed in the treatment of gnushot fractures of the mandible Control of hemorrhage catablishment of an ade quate airway temporary immobilization of the iractured bone, and treatment of shock are to be considered first. This is followed by minimal primary encision, without suture except when conditions are knowable for primary cleaner, and early immobilization of the fractured bone. Secondary minimal encision and débridement are done from 5 to 10 days after the injury secomposited or followed by delayed primary cleaner of the skin wound The authors recommend treatment of cottemyellits by early radical operation. Loys T Brass, M.D.

McNeely R. G Dr Adenolymphoma of the Sai ivary Giands. Caned. M Azr J 1945, 54 124.

Five cases of adenolymphoma of the parotid gland are reported. This type of tumor is infrequent only s cases having been found among 125 salivary sland tumors seen in the Toronto General Hospital path ological laboratory in a 10 year period. Only 2 cases of malignancy have been reported in the literature. The tumor becomes apparent as a slow growing mass near the angle of the lower jaw usually in the fifth, sixth, and seventh decade. Subjective symptoms are absent and the growth is encapsulated and easily removed. It is composed of tall, doubly placed acidophihe cells which line the ducts and glandlike arrangements into which may project papillae and which may be dilated to form cystic spaces. The epithelial atructures are supported by a lymphoid stroms with active germinal centers.

The generic of the tumor is discussed and reasons advanced in favor of the hypothesis that it arises from salivary duct epithelium. The lymphoid tissue apparently serves as a supporting atroma and appears to participate in the menphatic process.

JOHN R. LINDSAY M.D.

### NECK

McArthur J W., Rawson, R. W., and Means, J H.: Idiosyncratic Febrile Reactions to Thiouracti, Clinical Characteristics and Possible Pharms cologic Significance. Ams. Int. 11, 1945 3 915

Thiouracil was employed in the preoperative preparation of rop patients suffering from thyrotoclosis. Tork reactions (applying the term in the most in chaive sense) occurred in 15 instances. In 5 cases lever was the most completions feature of the reaction. The case reports of 3 patients who developed fever are presented, with speculations as to the fundamental alguideance of the following cases:

The sudden onset of fever after a relatively constant latent period of ro days, the arphoire immediate reaction upon readministration of the drug and the character of the accompanying symptoms assesset that thioursell reactions are manifestations of the true drug idiosyncracy. A review of the lit erature on the nature of thioursell reactions revealed the fact that attention has been focused on factors which may predupose an individual to develop an idiosyncratic reaction, while the precise chemical factors which render an agent capable of inducing hypersensitiveness have been largely neelected. It is Dointed out that the sensitizing especity of a drex depends upon chemical structure and that hyper sensitivity may be developed to the molecule as a whole or to certain radicals of the molecule. Propenanty to induce idiosyncratic reactions is stress presumptive evidence of a drug's capacity to become bound to protein. It is suggested that capacity to bind proteins is the common chemical factor which is responsible for the anaphylacticlike complications of chemotherapy as well as the therapeutic effect. The prevention of the rold hormone formation by the sulfonamides and thiouress may prove to be due to an enzyme blockade mechaniam.

Tons L. Lincount, M.D.

Kenting, F. R., and Cook, E. N: Recognition of Primary Hyperparathyroidism. J. Am. II Am., 1945, 129, 994.

Clinical hyperparathyroidinm may be divided into three groups, in accordance with the crient of the skeletal involvement. Group 1 comprises the case with the classic picture of oreight forces cyrtical generalisats, group 2 consists of cases with stypical demineralization of the skeleton, and group 3 includes the cases which showed no skeletal involvement but demonstrated renal calcult. Disease of the bone was demonstrated renal calcult. Disease of the bone was demonstrated renal calcult. Disease of the source of the cases. However renal calcult and calcifection were found in pa per cent of the cases. Classic bone this case seemed to be slightly more frequent in women than in men, whereas renal disease was more fre

quent in men. Symptoms of hyperparathyroldism were divisible into three groups in accordance with the chemical changes in the blood and urine, or the degree of in-volvement of the kidneys or of the skeletal system. Chemical changes in the blood were manifested by an increase of calcium and a decrease of inorganic phosphorus. As a result the symptoms were muscular atony weakness, fatigue and constipation, all of which could be correlated with the degree of hypercalcemia. Polyuria was present in 46 per cent of the cases and was regarded as being due to the excessive excretion of calcium and phosphorus. The latter also provided the basis for nephrocalcinosis. Hyperparathyroidism was suspected in any patient having renal calculi of calcium. Laboratory diag noxis was made on the basis of increased calcium and decreased phosphorus in the serum with a loss of calcium in the urine. Repeated blood determina tions were necessary since the elevation of calcium was slight. Thus, in 12 of the 24 cases of hyperpara thyroldism the blood calcium averaged less than 12 5 mgm. per cent. Ionic calcium was found to be specifically affected by parathyroid disease while the organic calcium proteinate was not so influenced With multiple myeloma or sarcoidosis there was a secondary hypercalcemia mainly in the organic fraction of the blood which accompanied a hyper proteinemia. When the value of serum calcium was equivocal, a low level of inorganic phosphorus, below 3 5 mgm per cent, served as a good diagnostic due. Elevation of the alkaline phosphatase was useful as an indication only of bone disease but not necessarily of hyperparathyroidism. Under properly controlled dietetic conditions a strongly positive Sulkowitch test for calcinuria was supportive of the diagnosis of hyperparathyroidism. With the Bauer and Aub diet normal persons excreted less than 100 mgm, of calcium whereas hyperparathyroid patients lost between 125 and 200 mgm per day. In groups I and a demineralization of the skeleton was manifested by pathological fractures multiple bone cysts, and miliary osteoporosis of the skull Dental roent genograms were significant when in conjunction with other bone changes disappearance of the lamina dura of the teeth was found. Examination of renal calculi caused by hyperparathyroidism showed a predominance of calcium oxalate.

demonstrated at operation In no case was a diffuse adenomatics of all parathypoid this use found. None of the adenomas in this series was in the mediastinum and none was considered malignant. After operative removal, the blood calcium and inorganic phosphorus returned to normal the former within two days and the latter more slowly. In go per cent of the patients tettany ranging from mild to severe, developed postoperatively. Severe tetany seemed to occur most frequently in those cases which exhibited extensive onseous change and high levels of alkaline phosphatase. Mild tetany was accounted for on the basin of a reverse shift in the calcium and

In all of the 24 cases a parathyroid adenoma was

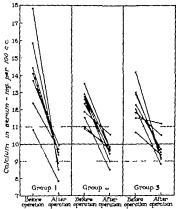


Fig 1 The changes in the average level of calcium in serum before and after removal of a parathyroid tumor. Each point represents the average of numerous determinations made, in most instances, over a period of several weeks. In 1 case in group 1 no significant change in serum calcium occurred following the operation. The level of inorganic phosphorus and the exerction of calcium were also unchanged, and this has been assumed to indicate that a second tumor is probably present.

phosphorus which created a temporary period of hypoparathyroidism B G P Shartsorr M.D

### SURGERY OF THE NERVOUS SYSTEM

#### PERIPHERAL NERVES

Sunderland, S.: Traumatic Injuries of Peripheral Nerves; An Analysis of the Incidence in 361 Consecutive Cases of Peripheral Nerve Injuries. Autral N Zealand J Surg. 945 15 25.

The author presents a statistical summary of sor consecutive cases of peripheral nerve injuries observed in military centers in Australia, during the period from 1941 to 1944. The data, summarized mainly in several charts give the incidence of injury according to the cause ([1] gunshot wounds of war and [s] kestons due to other causes? the location of the injury as to nerve or combinations of nerves, whether the injury was right or left-sided and whether the injury was complicated by bone injury as well. It was found that plexus injuries predom insted on the left that lesions of the ulnur nerve occurred twice as often as those of the median or radial nerves which were involved in approximately equal proportions and that in combined lexions the radial median and ulnar nerves were affected in equal proportions. In upper limb injuries single nerve lesions outnumbered combined nerve lesions 6 to 1 and upper limb injuries were three times as numerous as those in the leg Gunshot wounds of the sciatic perve were nine times as numerous as those due to other causes. In the gunshot injuries lesions of the ulnar nerve predominated also this nerve was more frequently the common factor in combined lesions than either the radial or median nerve. The commonest cause of peroneal nerve in jury was the pressure of a plaster cast.

JOHN MARTIN M.D.

Sunderland S: Blood Supply of the Sciatic Nerve and Its Popliteal Divisions in Man. Arck. New Psychiat., Chic., 1945 54 283

The author studied in considerable detail the gross and microscopic characteristics of the vascular patterns of the sciatic nerve in 40 adult human cadavers, with special attention to the gluteal region, the upper middle and distal thirds of the thigh, the poplitesi fosse, the neck of the fibule, and the upper middle and distal thirds of the lower portion of the leg. He found that the largest ar terise nervorum of the entire body were those supplying the sciatic nerve in the buttock and thirth (Fig 1) They were arterioles, and they arose from the inferior gluteal artery and the perforating anastomotic chain. Nutrient arteries of the direct type predominated, and these occurred in a T-pattern most commonly when they reached the nerva. The large nutrient vessels were found to enter the nerve directly in most cases, without a long superficial course in the upper sciatic nerve. In the popliteal fosse the largest vessels ran on or within the nerve but as the common peroneal nerve approached the



Fig. 1 Illustration of a dissection, aboving the blood supply to the sciatic error from the interior gitted artery crucial anatomosis, and, in particular, the perforation anatomotic chain. The nerve has been displaced medially to demonstrate the latter

neck of the fibula the larger intraneural vessels were found to occupy a superficial and exponed position in 58 per cent of the specimena, and a deep and protected position between nerve fasciculi in only 12 per cent.

Not only is the peroneal nerve a smaller and less will protected nerve than the thial, which might partially account for its susceptibility to pressure effects bott its also usually in the form of one make bundle so that its vessels have poor protection from outside pressure. Furthermore the peroneal nerve is poor in supporting and protective adjoose these. The thial arteriate nervorum have the added protection that they lie in crevices between several bundles of the nerve.

An excellent table is provided to show the source and number of the nutrient arteries to the sciatic nerve in man.

Jose Marrix, M.D.

Barnes, R., Bacsich, P., and Wyburn, G. M.; A. Illatological Study of a Predegenerated Nerva Autograft. Brk. J. Surg. p45, 33, 130.

For purely investigative purposes, the authors per formed an autograft in a patient with a large and irreparable injury to the ulnar nerve. Seven centimeters of the distal segment of the nerve were ex cised, and were then sutured to the freshened distal end of the proximal segment. The graft was 3 millimeters in diameter and the central segment was 6 millimeters in diameter so that contact of only about 25 per cent was obtained between the stump and the grait. Three fine linen thread sutures were passed through the sheath of the nerve to effect this contact, and the distal end of the graft was then su tured to the intermuscular septum. There was little or no scarring of the soft tissues in the new graft bed This operation was performed 613 days after the

After an interval of 168 days the wound was again opened and the graft inspected. There was onginal injury firm healing at the line of suture and at that point there was a firm fusiform swelling of the nerve The graft was firmer than at the time of insertion and it was not unduly adherent to the surrounding tissues. The graft was then stimulated with the faradic cur rent (this operation having been done under local anesthesia) but no sensory response was obtained dutal to a point I cm below the suture line. The entire graft together with 2 cm of the central stump was then removed for histological study

This autograft was found not to have undergone any central necrosis, and it had provided a pathway for new nerve fibers some of which were found to have proceeded for 20 mm beyond the suture line None of these new fibers were meduliated and the transition from meduliated to nonmeduliated char acter took place abruptly and immediately above the sature line. In the opinion of the authors this absence of medullation may have been due to ex tensive intrafasicular fibrosis which prevented nor mal maturation of the nerve fibers While the new nerve fibers in the graft were neither normal in anatomy or quantity it was of agnificance to the authors that such an old predegenerated autografi could receive nerve fibers after so long a time and that a central stump still could retain regenerative powers as long as 613 days after the onginal injury

## BRAIN AND ITS COVERINGS; CRANIAL

Murphey J P and Gellhorn E.; Multiplicity of Representation Versus Punctuste Localization the Motor Cortex; An Experimental In restigation Arch. New Psychiat Chic., 1945

This report of an obviously carefully worked out investigation indicates that there is a multiplicity of motor representation in the cerebral cortex rather than the commonly conceived restricted localization of motor function. In the words of the authors em phasis is shifted from solated cortical representation

to more inclusive cortical function. The animals employed in the study were the rabbit, cat and monkey these animals being chosen to determine whether or not results of cortical stimu

lation executed after an original concept of the authors, could be correlated with the principle of progressive encephalization. Such correlation was in fact, possible but to a limited degree, and the broad concept of multiple cortical representation was found to be maintained in this admittedly limited

The authors believe that in stimulating the cortex it should not be subjected to the weakest possible phylogenetic arc electrical currents but that the aim should be to evoke as much as possible of the total capacity for physiological response. Under such conditions of cortical stimulation they found that multiple representation of movement is widespread in the motor cortex of the rabbit, cat and monkey and that the most common type of multiple representation is that found in the large somatotopic divisions the leg arm and face. The cortical overlap of two large acm and lace. The council overlap of two saveth somatotopic subdivisions apparently decreases with progressive encephalization as the phylogenetic scale is ascended. The point is made that it is movements not muscles which are much more widely represented than the usual cortical maps would indicate Movements involving distal joints were not found biovements involving distributed than movements in-

The authors believe that this multiplicity of repvolving the proximal joints. resentation and the extent of representation of movements beyond the bounds ordinarily determined by threshold stimulation probably account for the re-tovery of function of individual parts of the body after contralateral cortical tissue has supposedly been removed

Oldberg S.: The Significance of Internal Frontal Hyperostosis and Some Related Changes of the Skeleton with Special Reference to Diabetes in the Aged (Ueber die Bedeutung der Hyperostosis frontalis interns and einiger verwandter Skelettvers eroderungen unter besonderer Beruecksightigung der Verhaeltnisse bel Altersdiabetes) U peda lak foren

During the last decades the cranial change, which for a long time has been called hyperostosis frontalis interna, has aroused an increasing interest from the clinical as well as from the pathologicoanatomical point of view Under the more comprehensive names hypophyseal cranial dysplasia metabolic crantopathy a more diffuse thickening of the calvaria is found while the afore mentioned endocrine origin of local frontal hyperostosis has been generally accepted the genesis of diffuse hyper ostosis is less clear and an association between both forms has not been proved Certain bony changes which have been assigned to the normal increase in which have been assigned to the horizon marcase in age, the so-called senile hyperostors, have been of age, the so-called senile hyperostors, have been of age, the so-called senile hyperostors, have been of the solid march discussion. The occurrence of the last mentioned change has been considered self-evident for at least 100 years but systematic investigation has not been made.

The clinical significance of the cranial changes is not clear They have been included together with adjocity and certain psychoneurological symptoms in the so-called Stewart Morel syndrome and with adjocity and virilism in the Morgagni syndrome. Some authors have emphasized that in case of local frontal hyperostosis a disorder in the carbohydrate metabolism in the diabetic sense may occur. The suggestion has been advanced that by confirming this bone formation an opportunity is afforded for diagnosing pituitiary diabetes. The circumstances, however are not cleared up and no research has been made on a larger scale.

From his x ray studies the author has tried to find out the appearance of the normal calvaria at different ages. The occurrence of the local frontal hyperostosis as well as the general thickness was observed, being directly measured on the x-ray plate at certain points. The results thus obtained were taken as a starting point and the same investigation was carried out on material consisting of selected cases of local frontal hyperostosis acromegaly hypophysesi adenoma operatively verified, and also a number of cases of senile diabetes. The author tried to clarify the so-called senile hyperostoris and the hypophyscal genesis of the diffuse thickening of the skull, and, by measuring the sagit tal diameter of the atlas tried to get a clear idea of the relationship of localised changes of the skull to more general disturbances in growth. By means of a comparison between cases with and without frontal hyperostosis and the diffuse thickening of the calvaria, respectively the author tried to find evidence for the clinical algulficance of these bone changes. Special interest was taken in the possibility of classifying the cases of so-called senile dia betes in two genetically different forms.

The result of the investigation can be summarized as follows

r Signs for the so-called scalle hyperostosis are lacking

2 Hyperostosis frontalis interna appears almost exclusively in female patients, usually first after the menopause, and increases in frequency with age. The endocrine disorder in these patients manifests fixelf furthermore in a delayed menopause.

3 The general thickness of the culvaria can be attributed directly to a disturbance in growth of hypophyseal origin. It is most pronounced with accuracyly and a little keep pronounced with chromophilic hypophyseal adenoms without acromegalic signs, whereas in the case of chromophobic adenoms the thickness is about normal, but still shows some difference.

4. Hyperostosis frontalis interns is positively correlated with a diffuse thickening of the cs parsetals and consequently with the diffuse thickening of the calvaris. Accordingly it often occurs in cases of acromegaly.

5 In cases of acromepaly as well as of local frontal hyperostosis there is furthermore, an enlargement of the sagistal diameter of the atlas. Thus, there exists an association among hyperostosis frontalis interns, the diffuse thickening of the calvaria and the enlargement of the atias, which must be considered as a general growth tendency in the akeleton. The hypophysical genesis of this bone change is discussed.

6 Hyperostosis frontalis interns and, to a certain extent, the general thickening of the calvaria are actent, the general thickening of the calvaria are in a co-ordinative relation with adiposity distincts, as the contract of the core name to be caused and hypertrichosis, there fore the term "Morgagal syndrome" seems to be inadequate. The occurrence of distincts and head-aches does not correspond to an increase in the blood pressure. In the diagnost of adiposity in its different forms the alorenamed bone changes seem to point to a hypophysical origin.

7. The occurrence of local frontal hyperesticals and to a certain degree even that of the diffuse thickening of the calvaria in women as well as in near, suggests the possibility of an extrainsalts of labetes of presents (a) a benign course not infrequently with spontaneous reasons, (b) a sight ackolot tendency and thus an inconsiderable risk of coma (c) a requirement of musilion only in a few case, exclusively those of persons who have been fill for saveral years and (d) a decrease in sensitivity to intuilio.

8 The occurrence of hyperfunction of the autricio tobe of the piculary giand expectably in women after the menopause (formerly chiefly recognized by an increased excretion of gondotropic hormone) in cludes even a growth promotive factor and probably also a dubetic one. The practical value of the forement of the forement of the picular control of the picular cont

Davison G., and Demuth, E. L.: Disturbance in Sleep Mechanism; A Clinicopathologic Study Lesions at the Corticodiencephalic Level. Ark. V in Psychia! Chic., 1945-54-341

Discrete lesions of the hypothelamus are known to cause interference with the normal physiological regulation of sleep and all the available clinical evidence indicates that lesions at the corticohence phalic level not uncommonly produce pathological sleep as well. The authors have had as patients with such pathological sleep syndromes. In all, either the cortex or the diencephalon, or both, were involved. Twenty-one patients suffered neonlastic disease, and the 4 other patients had brain abscess, encephalitis lethargica, diffuse syphilitic disease and vascular discase. A strikingly high percentage of the patients showed clearly an extensive change in the hypothele mus. This structure showed compression changes in 16 cases, actual invasion in 4 cases, and gross destruc tion in I case In a patients however the hypothalamus, though compressed did not show any change in the nerve cells. Also, in 16 patients there was in addition to the changes in the hypothalamus, compression or invasion of the basel ganglia with im plication of the strichypothalamic pathways. Inasmuch as most of the neoplasms in the series were found to have encroached upon the ventricular system a high incidence (18 patients) of increased intracranial pressure was present in this series

In a previous article the authors expressed the coming that some fibers for the control of sleep were believed to originate in the cerebral cortex especially the hypocampal, angular frontal, premotor and temporal convolutions. On the basis of the 25 case histories reviewed in the present article, they postulate that the following structures (both afterent and efferent in nature) are concerned with sleep regulation the medial forebrain bundle running be tween the ventromedial olfactory correlation areas of the cortex and the preoptic and hypothalamic areas the corticohyothalamic fibers via the forms, the inferior thalamic peduncle and a postulated hypothalamicoprtical tract. Joint Maxim M.D.

Bucy, P. C. Surgical Relief of Tremor at Rest
Ann. Surg., 1945 122 933

A case report is made of a 23 year old male with a disposis of unilateral Parkinson a syndrome on the inght side following chronic encephalitis the onset of which apparently took place at the ago of 5½ years. The patient showed marked unilateral tremor a weakness of the right lower extremity of slight degree and possibly some weakness of the right upper extremity.

Operation was performed, the central sector of the cortex of the left cerebral hemisphere was exposed up to the middle of the operative field. The cortex did not appear abnormal. All of the exposed cortex was electrically stimulated following which the posterior hall of the precentral gyrus was removed over the area which had caused movement (by stimulation) in the right upper and lower extremities. The area was resected subplially down to the bottom of the central subrass. The great rolandic vens and the communicating vens which crossed the region of extirpation were left insact.

Following operation, the patient had complete paralysis of the right upper extremity and marked weakness of the right lower extremity. There was gradual improvement in function of the right side without evidence of a return of the tremor

The last report (9 months after operation) stated that the patient was able to walk with his body upright, rather than with a hemiparetic gait. The tendon reflexes were increased on the right and al though this had been true preoperatively. There was no evidence of return of the tremor up to that time.

The area exturpated was the arm and leg' portion of area 4 Y and according to the author such exturpation can be expected to abolish tremor at rest in the contralateral upper and lower extremities. The procedure may be expected to produce some increased spasticity and increased perspiration over the right half of the body for a few days. No sensory alterations were noted. Howard A. Brows M.D.

Bailey, P: Chronic Leptomeningeal Thickening following Treatment of Meningitis with Sulfa Drugs. Ann. Surg., 1945 122 917

Four cases of meningitis are reported which were treated with sulfa drugs or penicillin. These cases demonstrated the sequelae which may occur despite the use of these drugs. In all 4 cases the acute purulent infection was controlled but despite this the condition went on to death or a serious sequel because of the fact that the drugs exert no restraining influence on the fibroblasts which proliferate rapidly in an attempt to organize the exudate.

As a result of these changes the leptomeninges become densely scarred and prevent the normal circulation of cerebrospinal fluid. There also may be construction of the blood vessels as a result of the same pathological process

The author intends to call attention to the dangers that may arise as result of these alterations in the nervous system, although early optimism may arise immediately following the administration of these drugs in the treatment of purellent meningitis.

If is not his contention that the drugs should not be used but he states that early diagnosis and intensive therapy with adequate doses before massive exudate has occurred may be of value in preventing these changes and improving the prognosis.

HOWARD A. BROWN M.D.

### SURGERY OF THE THORAX

### CHEST WALL AND BREAST

Spaiding, J. E.: Adenolipoma and Lipoma of the Breast. Gur's Hesp Rep Lond. 045 04 80.

The author reports the case of a 56 year old woman who had noted a swelling of the left breast for one year. Since the first socied the swelling the breast had stradilly enlarged Examination of the breast revealed a lump 8 cm in diameter immediately lateral to the areola. The mass was spherical, well defined and freely movable within the breast. The arillary lymph nodes were not enlarged. The breast was amputed.

The tumor mass was well defined. Microscopically the tumor consisted of fat tissue with blands of epithelium embedded in the fat. In the central part of the tumor there were large islands of epithelial tissue in which alveol, alveolar ducts and larger ducts could be distinguished.

The author considers this to be not a pure liponta but rather an adenolipoma. He described a lipomas of the breast that are in the Gordon Museum.

EARL O LATDETS, M.D.

### TRACHRA, LUNGS, AND PLEURA

Clark, D., and Gilmore, J. H.: A Study of 198 Cases with a Positive Coccidioidin Skin Test. Ass. Ist. M. 1946 24: 40.

One or more concided in intracutaneous tests were made on 379 patients, and from 125 with a positive reaction, 100 with residual roentgenographic indings in the lungs were chosen for study analysis and report. This investigation was made in the pulmonary section of an Army General Hospital serving the southwestern part of the United States in 1042

The fungus coccadioides immutis is found in and soil, and has been isolated from wild redents in central and southern California, Arisona, New Mexico and West Texas. The organism is diphasel, occurring in animal tissue as a spherule from 1-60 micra in diameter with a doubly refractile wall, and

multiplying by endosporulation.
The carliest nathological less

The earliest pathological lesion in man as surmised from suides on minals, is an infectious granuloms following the inhalation of infected dust or, more rarely entrance through a lesion in the akin. The infection is usually mild, self limited and involves the lungs and amounted mediastinal lymph nodes. Antibodies develop un the blood and the lesion disappears or fibrotis lesers a rounded or linear scar and solid immunity. Reinfection does not occur. Exceptionally an abscess may form in the lung or pleurs and heal by absorption and fibrosis, or it may break down and discharge organ isms through a bronchus which appear in the systum for months or years without canding sec ondary lesions. Rarely chiefly in individuals of the dark skinned races, the infection gains entrance to the blood stream and causes death. In survivon, granulomas appear throughout the body These tumors may be slowly absorbed or may form chronic absoraces.

The differential diagnosts included tubercolosis, residual pneumonitis fibrosis, healed septic abscess broachitis bronchiectasis Boeck's acrosid and metastatic malignancy. Attention was paid to residence in areas endemic for coccidioides akin tests for coccidioidis and tuberculum, the sediments test for coccidioidis and troberculum, the sediments test for test, specimen study of the blood for coccidioidis antibodies and roentgenographic examination of the chest.

Fifty-two patients had fever mild chills, cough, cocasional sight hemoptysis small amounts of mucoid sputnum, chest pain, and malaite. Four had akin manifestations. Evaluation of the langs could not be made without contegrograms, although plearisy plearisy with effusion, and pneumonitis secondary to couchloidal infection were sometimes

found on physical examination.

Coccidentiforny costs mimics tuberculoris however superinfection or the adult type of pulmonary tuberculosis is not characterized by hilar or me diastinal adenopathy Roeptgenographic findings may be grouped under five major types (1) with pneumonialike infiltrations (2) with tracheobronchial mediastinal or hilar adenopathy or a combina tion of both (1) discrete nodular type with a round or oval area of increased density from a or 3 to to mm in diameter occasionally calcified (4) with annular shadows having thick walls and (5) with upper lobe granular or with slightly nodular infiltrations with extension of linear markings into the hillum. As healing takes place initial pneumonia like infiltration is followed in some cases by com plete disappearance of the lesion, in others by nodular lesions, by annular lesions, or by strandlike infiltrations

Many individuals who have been in southwritten United States above a positive reaction to the cocalcioidin skin test, and some of these show room genographically persistent areas of increased density in the lungs which can be disregarded as a cause of feature Illness or disability if they are due to an inactive coccidioidal infection but they must be distinguished from tuberculosis and more narrly other potentially dangerous desases.

A long leason absent in previous chost films but present some time after an individual was on the desert is probably due to excelledolomycosis. Coccidiokim in concentrated from for skin testing in a 1 100 dilution with normal salme solution was obtained from Charles C. Smith of the Department of Public Health. Stanlord University

LYDIX JOHNSON M.D.

Camaner A : Cancer of the Lung with Initial Neurological Symptoms (Canceres de pulmón con remotogas io can consider the first statement of the first statement

Following a brief discussion of the many syn dromes due to pressure on the peripheral and central nervous systems by the growth of the metastases of pulmonary tumors the author notes that in the material at the Hospital Rawson in Buenos Aires the most common form of pulmonary tumor is silent and announces itself as a hemiplegia with a progressive subscute course with localization of the metastases at the level of the internal capsule, in the subcortical area, or in the ascending frontal or motor convolu tion. This metastatic growth then tends to invade the cortex in this area producing the Bravaus-Jacksonian type of epilepsy and later the other structures of the brain particularly the basal nuclei and ventricles and leads to an early death. There is a relatively ate appearance of evidence of intracranial pressure, the demise being due rather to the interruption of the vital nerve impulses from the central nuclei.

The article concludes with 4 typical case histories, all in males from 34 to 66 years of age. In each case the hemiplegia was on the left side, progressing rapidly to complete paralysis of the left arm and leg and in no case was any evidence of lung involvement observed until the x rays were used. By this means an original new growth was discovered at the hills of the right lung in r patient at the right vertex and base respectively, in 2 patients, and at the vertex of the left lung in the last patient. JOHN W BRESHAN M D

### Strieder J. W. and Lynch J. P. Putrid Empyema. N Excland J M 1946 234 1

A better understanding of putrid empyema to be distinguished by surgeons from pyogenic empyema will bring prompt recognition adequate treatment and long prompt accognition analysis of oo cases at the Boston City Hospital Boston Massachusetts from June, 1934 to January 1941 and of specific cases subjected to thoracic surgery between Jan usry 1938 and January 1941 demonstrates the

advantages of early radical surgery Putrid empyema a sloughing gangrenous pleur itis, is caused by anaerobic bacteria in symbosis and characterized by purulent foul, sulfurous or putrid pleural fluid and often gas. From 5 to 10 per cent of 530 cases of empyema treated at the Boston

City Hospital in 71/2 years were putrid Putrid empyema complicated lung abscess gangrenous [usospirochetal pneumonitis bronchice tass tubercalosis with secondarily infected blocked cavities which ruptured into the pleurs, pulmonary gangrene datal to obstructing carcinoma, and trauma. The acute stage of all putrid pulmonary infections is believed to be pneumonitis as distin

guished from pneumococcal pneumonia. The clinical impression on admission, was pieu monia the physical signs were those of fluid roent genograms showed consolidation even when fluid

was present. A history of foul sputum was diagnostically helpful. The patients early became toxic and delinous and showed signs of peripheral vascular collapse and the pulse was elevated out of all proportion to the temperature a feature common to all

Thoracentesis fluid with a foul odor was pathog nomonic. Direct smear revealed fusospirochetes anaerobic infections Angerobic culture of the pleural fluki demonstrated infection in which symblosis was involved and related to the antecedent disease. Vincent's angina pendental infection, and pyorthes alveolans were common in the patients from whom the organisms The infections are referred to as

fusospirochetal but anaerobic cocci are associated with them and are of equal importance Common to all anaerobes is their mability to live or multiply in an atmosphere rich in oxygen Con sequently open operation with adequate aeration and evacuation of the pus is the treatment of choice. Despite the consistency of the fluid there is prompt

If this is inadequate the pleurs is widely incised stabilization of the mediastlnum for about 10 cm A large prepared dressing is applied and the patient is quickly turned on his back. The dressing becomes saturated and serves as a tampon preventing air exchange while the large wound allows complete dramage. A quick change of dressing is made during expiration the third day Stabilization occurs from the fifth to the seventh day A gauge pack impregnated with activated sinc peroxide placed partly in the pleural cavity and partly in the wound controls odor and the wound is clean and granulating in from 5 to 7 days, when the tubes are inserted for convalescent care.

Sulfonamides and arsenicals are of no benefit, but penicilin is a valuable adjunct and effects cures in a certain percentage of cases Recovery is greatest with early operation Seventy five per cent of the patients operated upon in the first week recovered Only a patient lived when the disease had persisted to days before operation The surgical treatment generally given for postpneumonic empyema was not adquate for putrid empyens. The mortality under such conditions was 54 per cent. Three deaths among the at patients recovering from open resec tion indicate that a fatal outcome in spite of adequate surgical treatment is usually due to the primary discase. The results obtained demonstrate the bene fit of immediate surgery of the open type. The use of activated zinc peroxide packs is specifically helpful.

### HEART AND PERICARDIUM

Bianchi A E., and Rapaport, M : Sarcoma of the Right Auricle (Sarcoma de la auricula derecha) Arth. Soc orgeni, and normal B lir 1945 6 331

The author describes a primary surcome of the right auricle of fusocellular type which formed nu merous metastases in the lungs and showed a rapid evolution

INTERNATIONAL ABSTRACT OF SURGERY

Rattan, M. C., and Thompson, S. A.i. Hypopto-MISCELLANEOUS trinemia in Surfery of the Thorax, As. J.

Hypoproteinemia in patients with intrathoracle disease is insidious in onset and course, progressive in character and dangerous. Clinically a total protein value of below 3 gm. per cent will find bealing Protects value of Delow 5 gm. per cent will find healthmarkedly impeded. As the percentage is lossed gaping of fascial planes, hernixton, and eviceration. gaping or taketar passive, occurations, and evoccutation occur. The cardiorenal dysfunction attendant upon octut the extraorement of section accounts and an account and an account and an account and an account and account and account and account accounts. a construction value of below 3.4 gm, per cent will yield a

The balance of protein is obtained through the interplay of 4 factors (1) the engenous source ((lood) (3) the synthesis of albumin globulm, and fibringen by the liver after protein breakdorn and normogen by the aver and protein through increased metabolism and continued inflammation (effinion and empressa) and (4) the extretion (cutation and culpyena) and (4) the cuttown mainly urinary albumin. In thoracic surgery all of

The lowering of the plasma protein in cases re quiring thorace surgery is largely dependent upon quemit unitable surgery is sargery dependent upon the intrapleural condition. It is also moderated by the extent, type and severity of the operative pro-

The use of blood transfusions, plasms and amino achis by mouth or parenterally must be employed to augment protein intake when excessive postopers tire protein depletion is anticapated. conomical protein replenishment is obtained by the intravenous or intramedulary use of amino acids either the acid hydrolysate with tryptopian or the ensymic digest are suitable for this purpose.

Sanuel Kare, M.D.

1

He also collected 34 cases of sarcoma of the right suricle from the literature Histologically the Storths were formed by gant, round or palymorphic scills a few of the growths were fibroarcomes and fusocellular sarcomas One was a fibroblastic sar come and one a leiomyosarcoma.

come and one a intomyosarcome.

In regard to the mode of frowth, four types of
anirchic blastomas may be differentiated: (1) those of an infiltrating character only partially obstruct or an annual control of those growing cruber ing the surfaultr cavity (s) those growing cruber antly filling the cardiac cavity and transforming it and number the extract cavity and transforming to the author patient, into a narrow canal, (3) those affecting chiefly the superior years (273, and (4) those infiltrating chiefly the myocardium.

Among 35 cases collected from the literature by the authors metastases were found in the lungs in 13 cases in the heart in 10 cases in the mediastinal glands in 7 cases, in the liver in 3 cases and in the performing in 3 cases, while the suprarenal glands, brains Inferior vens cava, pancress and pieurs were less frequently the sites of secondary growths. In numerous instances multiple metastases were pres-

ent, but no metastasis was found in 12 patients. The authors patient was a woman 50 years of age who developed dyspines and an enlargement of the heart 6 months prior to her admission to the hospital. Auscultation failed to reveal any valvular lealons. careduction season to reveal any parvolations of the left upper extremity and Granushy an engine or the feet supper extremity and of the left side of the chest developed and a consider as the margement of the liver was noticed. Hemoptyris and edems of the lumbar region and of the lower extremity gradually appeared. An tubercle bacilli were found in the pleural extudate. The fever

The autopsy revealed a sercome of the right auncle arth metastates in the pieurs and the longs fibroplastic pericarditis and dilatation of the heart JOSEPH K. NARAT, M.D.

### SURGERY OF THE ABDOMEN

#### GASTROINTESTINAL TRACT

Fernandes, O: Roentgenological and Clinical Study of Duodenal Stants (Estudo radiológico e clinico das estases duodenais) Brasil med cirurg

1015 7 355

After presenting a short review of the embryolorical development of the duodenum, the author offers the following classification of duodenal obstruction

A. Intrinsic lesions (1) congenital partial or total absence of fixation with abnormal mobility and diverticulum, (2) acquired diverticula, bridges, ad hearons, modification of the mucosa, hypertrophy of the muscular layers ulcers tumors, and foreign hodies

B Extrinsic lesions compression by tumor and compression by a pedicle of the mesentery

C. Functional lesions spastic conditions hypo-

tonia and atony

A mobile first portion of the duodenum may form a festoon and cause obstruction. In other cases only the portion just above or immediately below Vater's papilla is abnormally mobile and in another variety of mobile duodenum only the third portion is involved. A total mobile duodenum is a rare malformation making up a part of the anomaly called common mesentery

A diverticulum may be located at the duodenojejunal junction or higher up Diverticulitis may be the sequel of duodenitis. An acquired diverticulum may form above a stenosis and results from a lack of equilibrium between the duodenal contents and

the resistance of the wall.

Bridges, bands and adhesions usually are the result of chronic adhesive peritonitis. Hereditary syphilis tuberculosis, cholchthiasis, and other con

ditions may produce an inflammatory periduoden itis Similar processes may follow more distant in fectious conditions located in the pelvis or around the appendix.

Intensive duodenitis may spread to the submu cosa and cause a hypotonus accompanied by a diminished peristalsis which leads to stars. Hyper trophy of the valvulae consiventes may also cause stasis Hypertrophy of the muscular layer may lead to the formation of a veritable sphincter

Ulcers may be caused by or provoke the occur rence of stasis because of adhesions and cicatricial stenosis Irritation of the mucosa by violent peri staltic and antiperistaltic motions and tranma of the epithelium in the presence of stasis may cause the formation of an ulcer Among benign tumors causing stasis the following may be mentioned adenoma fibroma lipoma, myoma, and hemangioma Such tumors may be sessile or pedunculated Malinnant tumors such as carcinoma, fusocellular sarcoma, myxosarcoma, and melanosarcoma are rare in this condition.

As to foreign bodies gallstones are the most fre quent.

A ptosis of the anterior branch of the vascular mesenteric pedicle may cause a pinching of the third portion of the duodenum. Two arteries may com press the anterior aspect of the duodenum, namely the superior mesenteric and the middle colic ar teries.

A chronic duodenal stasts is characterized by the following signs a rise of nonprotein nitrogen in the blood an increase of the alkaline reserve a consider able fall of the blood chlorides an intensified nitrogen excretion in the urme, a dimunition of chlorides in the urme and hyperpolypeptidemia.

JOSEPH K. NARAT M.D.



duodemm. Fig. 3. Submesocolic stenosing periduodenitis.

Fig. 1 Defective firstion of the supramesocolic segment. Stenosis of the duodenojejunal angle. Fig. 2 Total mobile

Golden, R., and Ducharma, P : The Clinical Significance of Deformity of the Cecum in Amebi asis. Relialogy 1945 45 565

Decause several cases were encountered at Preby terian Hospital, New York City in which the first suggestion that amebissis was present came from the demonstration of a deformed excum the authors undertook a review of the records of the 110 cases observed at this hospital in which amebiasis was either proved or thought to be present. In 108 of these cases the endamosche histotytics was recovered either from stools or timpes in several of the remaining cases only one stool had been examined.

The cases were grouped into (a) or with diarrhea. (b) 15 with abdominal pain without diarrhea, (c) 54 with no significant symptoms directly referable to the intestinal tract, and (d) o in which there was inadequate information in regard to abdominal pain. Barlum examination was done in as of the cases with duarrhea, of which 18 showed a deformed cecum among the o cases with abdominal pain a cecal de formity was demonstrated in 3 among the 18 in group c a cecal deformity was found in 4, and among the 7 cases in group & a deformed cecum was discovered in 5 Hence, of the 67 cases subjected to colonic barium study 30 (45%) showed a cocal deformity and this finding occurred 5 times as frequently in cases with diarrhea or abdominal pain as in cases without such symptoms. In 58 of this group of 67 the endamoeba histolytics was demonstrated in the stools and its presence was not disproved in the other o Of these 58 cases sx (36%) showed cecal deformity while another case with deformed cecure and ascending colon terminated in clinical recovery only after a course of emetine. Two other cases of proved amebiasis showed deformity of the transverse colon and a third revealed rectal stric ture. Hence approximately 50 per cent of the patients examined and 41 per cent of those with endamoeba histolytica in their stools had definitely abnormal roentgen findings to per cent of these deformities were of the cecum. In only a cases showing a deformed cecum was there also an associated deformity of the more distal colon but in none of the cases was the terminal fleum narrowed or intrinsically distorted.

In the majority of cases of deformed occum, the creal outline was amonth, and in a few irregular. The deformity to be significant, should be permitted in some degree throughout the examination. In 4 of the 5 cases re-examined after therapy for smallash some decrease of the deformity was noted but in the infilt case in which shrinkage was extreme to change resulted. The authors believe that at test a portion of the reversible change is due to cecal

As regards the differential diagnosis the authors point out (1) that in the large majority of cases tuberculosis involves both the econs and fleum although hyperplastic tuberculosis of the escum could simulate the deformity described above (2) that regional Beltis commonly involves the fleum often with resultant narrowing and irregulatly of the terminal portion, but it attacks the recum must less commonly (3) that carrisoms of the ceesa nazually produces an irregular asymmetrical Elina defect often associated with a palpable mass quite different from the causally smooth walled contraction cecum of ameliasis but, of course shootd a must be formed by a large amelic granuloms, it could not be distinguished recentrespoterally from carrisons

The authors conclude that recognizable the formity of the eccum without involvement of the terminal lleum is likely to be present in more than a third of the cases of amebians and that this deformity is a clinically valuable sign not dispossite, but definitely suggestive of the disease. It absence, on the other hand is of no value in ruling out the disease.

Clute, H. M., and Kenney F R.: Primary Anastomods in Carcinoma of the Colon. England J M., 945 33 799.

Sixty five cases of carcinoms of the colon are reviewed. The total mortality was as por cent (6 deaths) in 34 cases with resection and immediate anastomosis there was a single death, or a mortality of 3 per cent. Eighteen cases requiring Mikulica resection had a 4 per cent mortality (4 deaths). Seventien inoperable cases upon which only pairs three procedures could be done had a mortality of 19 per cent (5 deaths). Of the deaths among the re-sectable cases, 1 was due to shock, 1 to coronary thrembooks and 1 to pollmonary embolisms.

These cases evaluate the feasibility of immediate restoration of the intestinal continuity following radical resection of carcinoma of the colon. The authors intended to evaluate the use of chemotherapy in the improvement of their results but became impressed by the numerous factors that had improved colon surgery They emphasize the value of preoperative and postoperative care. The treat ment of anemia and protein deficiencies is ac complished with adequate quantities of blood and the intravenous administration of amino acids before and after surgery The authors value the use of sulfasuxidine in the preoperative reduction of intestinal flora and because of its mild lavative effect, but note that cases in which it was not used presented equally good results in many instances. They have discontinued the preoperative use of drastic purgatives. Gastric suction is advised for a day before operation and is continued postopera

tively until the return of normal perintalisis. The authors favor radical removal of the tumor and of the lymph glands draining the involved segment of colon. The Milkulies and other obstructive resections have been relegated to cases in which the risk is poor with partial obstruction or some degree of infection obscurace to can be done questly and the bowel is simultaneously decompressed. Resection and immediate anastomosis are preferred because of the many advantages to the patient, such as the elimination of spur crushing and of the an

noyances associated with a colostomy anastomosis has not increased the mortality. The authors did not use many eccostomles but believe that eccostomy is a worthwhile procedure to protect the anastomoses distal to it in the colon and to de compress the obstructed colon which eliminates the necessity of resection for the obstruction

The article presents the advances made in colonic resection in the last few years particularly since the introduction of drugs reducing the incidence of infection and the greater knowledge of fluid balance and of total nutrition of the surgical patient. FREDERICK C. HOEBEL, M D

### LIVER, GALL BLADDER, PANCREAS, AND SPLKEN

With, T K.: On the Occurrence in Human Serum of Yellow Substances Different from Billrubin and Carotenoids Acia med scand 1945 122 501

The author has described a method for the quantita tive estimation of the nonbilirubin yellow substance in serum by means of the Pulfrich photometer Investigation of the spectral absorption of pure solutions of bilirubin and solutions of bilirubin in serum were carried out, and it was shown that the proportion between the extinction of the diazo re action with filter S or and that of the spectral absorption of bilirubin with S.43 in the Pulfrich photometer (E 61/E.43) for solutions in serum had a constant value with only little variation from one

The determination of the proportion E 61/E-43 serum to the other of different sera showed values considerably below the characteristic value for pure bilirubin serum Consequently the solution for most of them regular occurrence in human serum of yellow substances different from bilirubin is to be looked upon (by the author) as an established fact. It was also demonstrated that the concentration of these yellow substances in serum was of the same magnitude as the bilirubin concentration. It exceeded the con centration of the serum carotenoids considerably Further it could be demonstrated that hemoglobin or biliverdin could not be the cause of these findings

The chemical nature of the nonbilirubin yellow substance and its physiological properties are discusted and the hypothesis is advanced that in human serum it is identical with the xanthorubin of he patectomized dogs and with the pyrrol compounds bihfuscan or mesobihfuscin David H LYNN M.D

### Clagett O T., and Hawkins, W J : Cystic Disease of the Liver Ann. Surg 1946 123 111

Simple solitary cysts of the liver are localized and urually circumscribed, and occasionally they possess a pedicle. The result is that surgical treatment is far more often possible for solitary cysts than for cystic disease, wherein the lesion is more generalized with

The authors patient was a married man 39 years reference to the liver of age. His chief complaints were a feeling of full

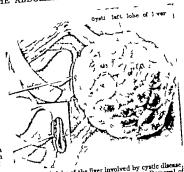


Fig 1. Left lobe of the liver involved by cystic disease, tourniquet applied around its pedicle. Inset Removal of left lobe of liver and closure of peckele with interrupted mattress sutures. (Courtesy of J. B. Lippincott Co.)

ness and dull aching in the epigastrium. This dis tress had been present for 4 years. The symptoms progressed until at the time of his examination at the clinic, he was aware of a large mass in the epi gastrium and was unable to ingest even a moderate amount of food without feeling discomfort. In spite of the normal results obtained in investigating the pancreatic function, it was thought that the epigastric tumor was probably a pancreatic cyst.

Accordingly on August 12 1944 operation was performed through a primary upper left rectus incision. Immediately a portion of the mass con assuing of multiple various sized cysts presented itself into the incision. On further examination it was found that this represented the left lobe of the liver Examination of the right lobe showed it to be normal in appearance. Palpation of both kidneys was then done and neither seemed to be cystic. By separating numerous adhesions from the mass, a relatively narrow pedicle was encountered adjacent to the ligamentum teres. A Bethune pneumonec tomy tourniquet was then applied around the pedicle (Fig 1) and the entire left lobe of the liver was removed en masse. The remaining stump was closed with interrupted chromic catgut sutures The tourniquet was then removed and there remained only minor coming of blood from the stump

Five grams of sulfanilamide powder were aprinkled into the area and one double iodoform pack was placed to control what ooring might occur from the stump Two Penrose drains were brought out through the incusion. The specimen included the entire left lobe of the liver consisting of multiple cysts lined by epithelium of the bile duct type. The postoperative convalescence was uneventful.

As iar as the authors were able to determine from the literature, this case is the first one reported in which the entire left lobe of the liver was removed for cystic disease. The only other reported case of a similar nature was that of von Haberer who in 1905 removed the entire left lobe of the liver because of a nonparasitic solitary cyst which occupied the greater part of that lobe.

Most authors agree that the cause of the simple solitary cyst is some form of local obstruction in the biliary tract with a resultant retention type of cyst. In cystle disease however opinion seems to be divided since there are various hypotheses as to its

pathogenesis.

All of the articles reviewed make special mention of the fact that cystic disease of the liver is usually associated with cystic disease elsewhere—notably in the kidney. When there are associated renal lesions, they are usually far more advanced than the lesions in the liver.

If a cyatic liver has enlarged to the point of cataing a palpable mass, the identity of which cannot be proved then exploration of the abdomen is advasble. When such a lesion is encountered two alternatives are possible (1) the involved portion can be removed or (a) nothing should be done. The decision to excess the lesion must be made only after several factors have been considered. The kidneys abould be palpated. If they too are involved seriously then there is no point in attempting to excise a portion of the liver the hazards of this procedure are well recognitive.

If the patient has been asymptomatic in spite of the presence of the cyatic liver and if removal of the tumor would involve too great a risk, then one hand, the tumor is interfering with the patient's well being, the kidneys are without palpable involvement, and removal of the lesion would not be too hazardous a procedure, then extirpation cer tainly is justifiable.

### Mirizzi, P L.: The Diagnosis of Choledocholithiasis (Diagnostico de la colédocolitissis) Preus méd.

argent 1045, 3 #039. The value of the usual preoperative clinical and laboratory procedures for the detection of stone in the common duct and/or the adjacent hepatic bile passages is admitted, but the author deprecates the fact that they should play more than a modest role in the integral degrees of choledocholithiasis. Attempts at preoperative filling of the common bile duct with shadow producing medium by reflux from the duodenum (duodenal catheterisation) is mentioned without enthusiasm and as being only rarely successful Even the nonsurgical cholangiography of Lee of Philadelphia, whereby the gall bladder is injected with a shadow medium through a peritoneoscope is regarded askance as being ementially a surgical procedure, as being applicable to not more than to per cent of the gall bladders, and as being of uncertain innoculty because it leads to billary peritonitis and other accidents. In fact, all of these procedures pale in significance in face of the inescapable duty of the surgeon, not only to arrive at the diagnosis of choledochothitas, but also the centum that the patient has been freed of all the normal that the patient has been freed of all the normal that the bile duct. Even laparatomy with discreptions of the choledochots, choledochotomy with maximental probleg of the bile passages and perhaps the choledochotomy of McLiver are not without objections, and although of add in determining the presence of canalicular lithiasis in a large proportion of cases, they do not afford an absolute diagnosis.

Operative cholangiography on the other hand has contributed extensively in confirming the diagrams of stone in the bile tracts it is a valuable source of information in lithiaris of the ampulla of Vater and intrahepatic stone it furnishes capital data on the psuedotumoral form of choledocholithians, and represents an irreplaceable recourse for providing assurance that all of the concretions have been re moved from the principal bile duct. In the case of the calculus located at the ampulla of Vater even when it is too small to show on the film as the usual nunch press defect at the lower end of the common bile duct (where the usual outline of the amoulla would be expected) or as the less common defects such as the right angled uncoform parrot beaked. festooned and angulated defect appearance, its presence will at times be suspected by the refux into the duct of Wirsung-which is more persistent than in the cases of simple dystonia of the sphincter of Oddi.

This question of negalstence, however, also brings up the matter of the functional criterion in the roent genological examination of these patients, that is, the taking of one or more cholangiographic exposures following the original one. For instance, in I patient of the author's material, the first film disclosed a typical inflammation of the sphincter of Oddi with the usual "Havana cigar" tip to the ampulla another film was taken and this proffered the classical image of calculus of the papilla (punch press defect) with injection of the duct of Wirsung in another the first exposure depicted a punch press defect, while the subsequent film showed the condition to be normal. Of course, the taking of two, or of several films at varying intervals is not of itself sufficient to solve all the problems in stone in the bile ducts frequently all attainable facts will have to be mar shalled to arrive at a correct diagnosis.

In a patient a history of persistent fectors caused the author to emplore the nonlilling left hepatic duct where, in spite of the fact that hepatic duct storas are nearty always multiple, and primary store in the hepatic duct without accompanying involvement of the common duct is a great curiosity a single large stone, the shape of a Winchester bullet with nonpointing downward was extracted from the hepatic duct. After this the hepatic system filled normally with shadow medium. At operation in this case the choledochus was found to fill and empty into the duodenum in an unonstructed manner.

However stone is not the only condition preventing the filling of part of the bile tract during the operative cholangiographic examination. It may be necessary in addition to injecting the shadow mix ture through the gall bladder or the stump of the cystic duct, to open the choledochus itself and make an injection through the choledochotomy opening Or it may even be necessary to provide the injecting syringe with a filiform catheter and push this into the different sections of the ble tract system. This is likely to be necessary in the dilated and distorted passages of the longstanding recurring case of gallstones.

Even if all methods have been exhausted without an explanation of a longstanding clinical history of mechanical licterus one is still justified in suspecting an obstruction below any of those uncovered a concretion in the ampulla of Vater a stenosing pancreatitis or inflammation of the sphincter of Oddi. In any case the ampullar stone is the more probable, and one is justified in resorting to a transduodenal

papillotomy

One of the most difficult problems is the different ation between the obstruction due to stone accompanied by a psuedotumor that is the matting together by adhesions of the epiploon, colon gastric antrum and pylorus pancreas and bile sac, and a true neoplasm. Here again however the author holds that operative cholanguography will be of assistance, in that in the obstruction by stone the injected shadow material surrounds the concretion and reveals the lacunar characteristics of this form of obstructing body while in the neoplastic type of block the hindrance to the flow of fodo-acetate will be complete.

John W Brennau, M.D.

### Robertson H. R.: Silent Gallstones Gastrocateral #17 1945 5 345

The author gives a very comprehensive historical review of the literature concerning gall atones. He surveyed the results of postmortem studies of the gall bladder made at the Mayo Clinic during the 10 years from 1934 to 1943 on persons over 20 years of age A total of 1,027 had gall stones 497 males and 530 females In this study no attempt was made to determine the percentage of patients who at post mortem did not have, and apparently never had gall stones The author with a coauthor found that of 16,036 postmortem examinations at the same chnic in the years from 1910 to 1942 16 3 per cent (12 6 per cent in males and 22 6 per cent in females) revealed that the person had or had had gall stones In the present review the histories of these patients were carefully reviewed and it was found that in 626 (61%) there apparently had been no suspicion by the patients or their attending physicians that gall stones had been present. The remaining 400 cases could be fitted into various and sometimes over lapping categories for example, 305 of the patients had undergone one or more operations for gall stones while in 80 cases stones were discovered accidentally at laparotomy for some other condition.

The assertion by some physicians that a certain percentage of silent gall stones in any given series

is a reflection on the diagnostic abilities of the at tending physicians is unwarranted. After gall stones have been accidentally discovered the at tribution of the symptoms and signs to their presence is not always on a sound clinical or pathological basis. About 50 per cent of gall stone cases remain unrecognized. Not all gall stones discovered during life warrant operation for their removal they are an individual problem in each instance and are usually accorded that importance which the best welfare of the patient warrants.

EARL O LATIMER, M.D.

Skelton, M O and Torey G H Congenital Obliteration of the Bile Ducts and Icterus Gravis Neonatorum Brit M J., 1945 2 914

The authors state that icterus gravis neonatorum and congenital obliteration of the bile ducts may both be associated with biliary obstruction. In the former condition the canaliculi may be plugged by bile thrombi probably as the result of damage of the hepatic cells Once these thrombi have formed they may aggregate to produce an obstructing mass in the extrahepatic bile ducts the final effect being to add an obstructive element to the jaundice caused by the hemolysis Occasionally the biliary epithelial cells become swollen and this tends to aggravate the condition Desquamated epithelial debris lying free in the lumen of the bile ducts may add further to the obstruction In some cases of icterus graves of long standing biliary stasis may occur and produce a picture of hepatic cirrhosis which is very similar to that of congenital obliteration.

Two cases of interns gravis are described, in which obstruction was believed to have been due to blocking of the large bile ducts with inspissated bile. In one case the plug was dislodged at operation. The fathers of both patients as well as the patients themselves were thesus positive. The mothers were rhesus negative with Rh antibodies in their blood.

The authors describe 2 other cases of congentral fibrosis of the bile ducts, in both of which there was a rhesus incompatibility demonstrated in the parents. Two siblings of one of these parents born subsequently died of jaundice. The findings at autopsy included crythropolesis and keructerus in

both cases.

It is not suggested that all cases of congenital obstruction of the bile ducts are associated with erythroblastosis fetalis but the fact that some of them appear to be associated with intereus gravis meanatorum is of practical importance. Consequently any family showing a history of congenital obliteration should be examined for evidence of thesus incompatibility. Only in this way can preparations be made to anticipate hemolytic disease which may occur in subsequent children.

As a prophylactic measure in patients with icterus gravis, the practice of massage over the region of the gall bladder is recommended in the hope of avoiding plugging of the ble ducts and hence obstructive THOMOGEN B MASSET, MLD

Smith H G., Pratt Thomas, H. R., and Mace, L. M : Re-Establishment of Pancreatic Secretion into the Intestine after Division of the Pancreas; An Experimental Study Arck Surg 1945 TI 164.

As a result of progress in the radical operative treatment of carcinoma involving the head of the pancress and the periampullary region, pancreatic cancer can be approached today with a clearer concept of the operative technique and with a reason able chance of accomplishing a surgical cure

Despite widening experience with this difficult surgical problem, the incidence of postoperative complications remains high Some of the more distressing postoperative sequelae are referable to the stump of the divided pancreas and consist of external pancreatic fistula, acute pancreatic necrosis retention cyst, and chemical or "enzymatic peritonitis. The pancreatic stump has been handled generally speaking by one of two methods occlusion by inversion of the sutures with or without ligation of the duct of Wirsung and some form of pancreaticoenterostomy in which the stump is im planted into a seament of intestine. As regards the arst method digestion of the inverting sutures occurs all too frequently with resulting leakage of the pancreatic fuice and the consequent development of one or more of the complications mentioned. As to the second method the question has been raised whether reimplantation of the pancreatic duct into the gastrointestinal tract is necessary inasmuch as it is well established that many patients live normal, healthy lives after being deprived of the external secretions of the pancreas. On the other hand, many such patients suffer severely from disturbances of fat direction in the form of steatorrhea and malnutrition so that it is important, whenever possible to maintain the external accretory function of the An evaluation of techniques of pan creaticoenterostomy employed by various investi gators directs attention to two important factors

all procedures (with the exception of Cattell's simple method) involve an open anastomosis, with a consequent breach in asepsis and most of them are too time consuming This experimental study was conducted in order to develop an aseptic technique which can be performed with minimal loss of time and

preservation of the external pancreatic secretions. Experiments were done on as dogs. In 15 animals the pancress was divided at the junction of the uncinate process and the body without disturbing the relationships of the latter to the duodenum and thereby leaving the junction of the main pancreatic duct intact. The exposed transected surface of the pancreatic body was closed with sutures after ligation of the duct. In this manner the uncluste process was isolated entirely from the remainder of the gland, and its independent blood supply was main tained. The divided end of the duct in the uncinate process was allowed to retract into the parenchyma of the gland without its being ligated. The stump of the divided uncinate process was then implanted

into the jejunal wall in an incision that extended down to, but not through, the jejunal mucosa and was made secure in the journal wall by fine snimes. The remaining 7 animals were operated on by a modification of the technique of Cattell. The procedure was similar in detail to that described event that the unclnate duct was desected free so as to protrude from the divided stump of the gland. A crushing ligature of fine surgical gut was tied about the protruding duct and one end of the ligature was passed as a suture through the exposed februal submucoes and tied firmly to the other end which brought the duct against the mucosa in a firm necrotizing ligature. The pancreatic stump was secured into the februal wall in the usual manner All animals survived and remained in good coodstion. Observations of the state of the pancreaticoenterostomy were made at intervals varying from f to 48 days by the following technique

The abdomen of each dog was reopened under anesthesia and the jejunum adjacent to the pan creatic attachment was opened widely which ex posed to inspection the jejunal mucosa at the site of the pancreatic implantation. A concentrated. highly active preparation of secretin was then infected into the vena cava. If a fistula had developed from the uncinate stump into the jejunum pancreatic juice could be seen grossly dripping from the fistular onlice in the mucosa. If fistula formation had not occurred no response to the secretin was noted. The potency of the secretin was tested by opening the duodenum and observing simultane ously the flow of bile and pancreatic juice from the ampulla of Vater Of the as animals studied, 15 showed definite secretion of pancreatic juke at the pancreaticojejunal junction after the intravenous

injection of secretin.

After the functional status of the pancreaticoiciunal function had been determined, the entire unclosite process and the attached felunum were excised for microscopic study with particular ref erence to acute pancreatitis pancreatic fibrosis, and the development of pancreaticojejunal fistules. None of the animals showed gross evidence of active peritonitis or fat necrosis. There was some evidence of acute pancreatitis in 17 per cent of the animals but pronounced diffuse pancreatitis was found in only a animals. Each of these animals appeared to be quite healthy. Some degree of scar theue formation was demonstrable in or per cent of the animals but fibrosis was considered pronounced in only I animal. This animal presented an indurated and atrophic stump but no microscopic evidence of fistula. Despite these findings, the response to secretin was positive although the flow of pancreatic juice was aluggish. Definite marroscopic evidence of a function between the mucosa of the uncinate duct and the mucross of the jejunum was detectable in 50 per cent of the animals. It is pomted out that a fistula may exist despite failure to demonstrate it microscopically by the secretin test and also by the injection of water through the

uncanate duct into the jejunum. No external pan creatic fistula was encountered and only 1 retention cyst which complicated the procedure was found form L. Lampourst. M.D.

Varco, R. L.: A Viethod of Implanting the Pan creatic Duct into the Jejunum in the Whipple Operation for Carcinoma of the Pancreas. Surgry 1945 18 569.

The author presents a technique for anastomosing the pancreatic duct to the bowel in cases of resection

of the head of the pancreas. This procedure has now been successfully carried out in a patients

The pancreatic duct is isolated with a short extra glandular section preserved when the gland is transected. Two time like sutures are placed in the wall of the duct to hold it open. A two-holed catheter somewhat larger than the duct is selected—about a size 12. Eight centimeters of the catheter are stretched over a Keith skin needle which serves as an obturator and impaled at a point on the catheter wall slightly eccentric to the tip. 1s the segment of

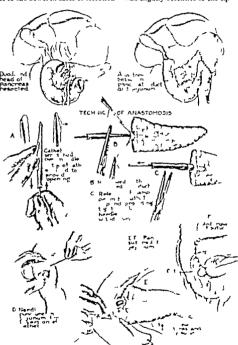


Fig. 1. The two drawings is the top indicate approximately that in field by malagnancy and diagram the reservation from a fit of the set of trace during lasted on the Dean split of concation for any some of the lasted the punctual. The technique of implanting the panetratic duct but the figurum is shown in additional to the figurum is shown in additional to the figurum is shown.

catheter is stretched over the obtunator its transverse diameter is decreased. It is held stretched by clamping the tube and obturator firmly with a hemostat. An oblique section is now cut from the tube, care being taken to place this distal to the tented will of the catheter. The stretched catheter is alipped a short distance into the pancreatic duct and on release of the hemostat the catheter is permit ted to resume its normal diameter and it is smally held in the duct. A fine ligature may if desired be used to hold the extraglandular duct against the catheter, but usually this is unnecessary

With fine sutures the posterior capsule of the pancress is sutured to the jojunum at the site selected for susatomesis. A fine puncture hole is made with a Kelth needle through all layers of the howel will and the catheter is forced through this small puncture wound into the humen of the howel, which gives a very close fit. Two fine sutures are placed between the connective thruse adjacent to the duct and the serous next to the puncture site. The remainder of the capsule of the pancress is sutured to the bowel serous, nextly the antioprosphere.

In 4 cases in which this method has been used there has been no pancreatic fistula.

EARL O. LATINGE, M.D.

Wakim, K. G., and Mason, J W: The Effects of Adrenalin and Nambutal Anesthesia on Blood Constituents Before and After Splenectomy J Les Clin. H 946, 31 8

The authors studied the effect of adrenaline and of membraia mesthesis on the concentration of hemoglobin and plasma protesms and on the red and white blood cell counts in intact and splenectomized dogs. The lateral surface area of the spleen was determined under nembraia mesthesis before and after the administration of adrenaline.

They found that the intravenous administration of adminish increases the concentration of hemoglobin and the red cell count in the circulating blood to a much prester extent in instact than in sphenomized dogs. Nembutal anexthesia cames hemofilution with a reduction in the hemoglobin concentration and in the red cell count, and a slight reduction in the plasms protein concentration. The size of the pleen in dogs under nembutal anexthesia was decreased about 60 per cent by the intravenous administration of adrenaline. The blood squeezed out by the spleen during its contraction under the influence of adrenaline had an average hemoglobin concentration about 11 per cent higher than that of jugular blood.

#### MISCELLANEOUS

Bradford, B., Jr., Battle, L. H., Jr. and Passchoff S. S.: Abdominal Surgery in an Evacuation Hospital. A s. Surg. 1946, 3 32

The observations presented were made on 341 abdominal war wounds operated upon in a single evacuation hospital from the middle of June, 1944

through December 1944 in the European theatre. The distance of the hospital from active finite varied from 4 to 30 miles. The cases included all of those with penetrating and perforating wounds to volving the peritoneum perforating wounds of the rectum and major retroperitoneal injuries requiring cellotomy.

The diagnosis of intra-abdominal perforation was usually obvious in battle casualties. Signs of peritoneal irritation were frequently absent during shock, but appeared when it was relieved. Symptoms of peritoneal irritation appeared late in wounds of the left colon, and a silent abdomen was the rule when peritoneal irritation was present. Shoulder pain was not important, and the absence of liver duliness was not a constant finding. Proctoscopy and sigmoidoscopy were invaluable in uncovering rectal and algoroid perforations. Location of the foreign body roentgenologically was helpful. Urin alyais was a routine procedure in all cases of ab-dominal injury and with cathetensation was useful in exposing wounds of the urinary tract-When in doubt as to whether intraabdominal per foration existed, an emboratory laparotomy was done.

Preoperative management is stressed as being frequently the decisive factor in the outcome of cases of abdominal injury. All patients were sent to the shock ward first, whether shock existed or not-Both blood and plasma were used but the former was believed to be of most value and a quantity of I liter or more was usually necessary to relieve shock in individual cases Patients with active intra abdominal bleeding and abdominal evisceration were sent directly to surgery with blood running because they did not respond to shock therapy untisurgery was done. In judging the optimum time for surgery the patient's general condition and skin warmth were valuable aids. Single blood pressure readings were misleading but multiple readings were helpful. However patients with a blood pressure of below 80 systolic did not tolerate surgery well. The time interval before surgery was not found to be important except in cases of continued bleeding and evisceration at intervals and some patients under shock therapy were operated upon as late as 36 hours after injury however the policy was to give all patients the benefit of surgery whether or not they responded to shock therapy

The mortality in the cases of patients who were operated upon 6 hours from the time of injury was 30 per cent. The mortality dropped in the subsequent air hour periods until at the 24 to 8 hour period it was but 10 per cent. The high early mortality was partly explained by the fact that the most deperate cases were operated upon first.

Where multiple major wounds existed the policy was to perform the separate procedures over a period of days rather than have several operative teams working at the same time.

In most cases the anesthetic of choice was nitrous oude vygen, and ether in a closed system prefer

Open dron bly with intratracheal intubation our with initialization and interest shock from there was valuable for patients in severe shock from the was valuable for patients in severe shock from the was valuable for patients in severe shock from the way of the wa

In combined chest and alidominal wounds the thal were unsatisfactory thoracic problem was handled first thorack approach to the diaphragm was most useful la treating wound of the dial hazkin plees and some Fastric would faramedian merion, with telegration of either of the recti muscles were u ed rest frequently Exposure through nethers proved sen u eful especially in cares with

lafunes of the stomach liver and spleen and the hepatic and splenic flexures of the colon The authors state that systematic examination of the abdominal contents is important wounds of the small box el is preferable to rejection and end to-end auture was the procedure of choice Enterostomy of the small

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following recetion Small wounds of the cecum and a cending color bowel should not be done were sutured and a large Pezzar catheter was were sources and a sarge a carral carriers may lared in the recum as a safety valve. In the transverse descending and aigmoid colon the Vikuliez ver preferably the loop-type of colontomy was per or preferably the loop-type of colonto formed. In rectosumoid perforations those within the peritoneal cavity were sutured with a proximal

inguinal a time down only to direct the local stream In extrapent cal perioral and the recture a le drate drains e with temoral of the excess of recei any and a pr aims eco pay were done

Wound of the liver were managed by Jucking o th use of free gued grafts. Woun self the pren

Theorem is constructed with the or win tele to a layers and reinfected with talk or win tele to a nically required then et my suture Drains e cf the peritoreal cavity, was 

Importative care included adequate hydratica and the liberal use of pla ma and who e flood t maintain Hoed protein levels. Wangen teen dea n mamiani and multiply in all perferentiates at dominal care Prestamine wa given I by helac ficulty in the minerate I accounting latter Vitamin Can Ht arms were given erall Levelly wa n'el routisely in all ea el an l le bice battial credit for the low irei ence (16 per ceat) of [3] no ary infections. Postoperative wounds frett, a were rarely enter a tered a lithis was attributed to the u e of pentrillin and the sulfa stupe al a port enerative intertinal characters in the early post operative period even after extensive surpread

Printing C II itel 1D procedure was rare

catheter is stretched over the obturator its transverse diameter is decreased. It is held stretched by clamping the tube and obturator firmly with a hemostat. An oblique section is now cut from the tube, care being taken to place this distal to the tented wall of the catheter The stretched catheter is alipped a short distance into the pancreatic duct and on release of the hemostat the catheter is permit ted to resume its normal diameter and it is snugly held in the duct. A fine ligature may if desired be used to hold the extraglandular duct against the catheter, but usually this is unnecessary

With fine sutures the posterior capsule of the pan creas is sutured to the jejunum at the site selected for anastomosis. A fine puncture hole is made with a Keith needle through all layers of the bowel wall and the catheter is forced through this small puncture wound into the lumen of the bowel, which gives a very close fit. Two fine sutures are placed between the connective tissue adjacent to the duct and the serosa next to the puncture site. The remainder of the capsule of the pancress is sutured to the bowel serota namely the anterior aspect

In 4 cases in which this method has been used there has been no pancreatic fistula.

EAST O. LATRICE, M.D.

Wakim, K. G., and Mason, J W : The Effects of Adrenatin and Nembutal Anesthesis on Blood Constituents Before and After Spienectumy J Lab Clin. II 1946, 31 18.

The authors studied the effect of admostline and of nembutal anesthesis on the concentration of hemoglobin and plasma proteins and on the red and white blood cell counts in intact and splenectomized dogs The lateral surface area of the spleen was determined under nembutal anesthesia before and after the administration of adrenaline

They found that the intravenous administration of adrenaline increases the concentration of hemoglobin and the red cell count in the circulating blood to a much greater extent in intact than in solenectomized does. Nembutal anesthesia causes hemodilution with a reduction in the hemoglobin concentration and in the red cell count and a slight reduction in the plasma protein concentration. The size of the spleen in does under nembutal anesthesia was decreased about 66 per cent by the intravenous administration of adrenaune. The blood squeezed out by the spleen during its contraction under the influence of adrenaline had an average hemoglobin concentration about 11 per cent higher than that of fuguiar blood EARL O. LATTER, M.D.

#### MISCRILLANEOUS

Bradford, B., Jr., Battle, L. H., Jr and Passchoff S. S.: Abdominal Surgery in an Evacuation Hospital Ann Surg 1946 3 3

The observations presented were made on 341 abdominal war wounds operated upon in a single evacuation hospital from the middle of June 1944

through December 1944 in the European theatre The distance of the hospital from active fighting varied from 4 to 30 miles. The cases include all of those with penetrating and perforating wounds in volving the pentoneum perforating wounds of the rectum and major retropentoneal injuries requiring celestomy

The diagnosis of intra-abdominal perforation was usually obvious in battle casualties. Signs of pentones irritation were frequently absent dunor shock, but appeared when it was relieved. Symptoms of peritoneal irritation appeared late in wounds of the left colon, and a silent abdomen was the rule when peritoneal irritation was present. Shoulder pain was not important, and the absence of liver duliness was not a constant finding Proctocopy and sigmoidoscopy were invaluable in uncovering rectal and sigmoid perforations. Location of the foreign body roentgenologically was helpful. Unnalysis was a routine procedure in all cases of abdominal injury and, with catheterization, was useful in exposing wounds of the unnary tract. When in doubt as to whether intraabdominal per foration existed an exploratory laparotomy was

done Preoperative management is stressed as being frequently the decisive factor in the outcome of cases of abdominal injury. All patients were sent to the shock ward first, whether shock existed or not. Both blood and plasma were used, but the former was believed to be of most value and a quantity of I liter or more was usually necessary to relieve shock in Individual cases. Patients with active intra abdominal bleeding and abdominal evisceration were sent directly to surgery with blood running because they did not remond to shock therapy until surgery was done In judging the optimum time for surgery the patient's general condition and skin warmth were valuable aids. Single blood pressure readings were misleading but multiple readings were helpful. However patients with a blood pressure of below 80 systolic did not tolerate surgery well. The time interval before surgery was not found to be important except in cases of continued bleeding and evisceration at intervals, and some patients under shock therapy were operated upon as late as 36 bours after injury however the policy was to give all patients the benefit of surgery whether or not they responded to shock therapy

The mortality in the cases of patients who were operated upon 6 hours from the time of injury was 30 per cent. The mortality dropped in the mbsequent six-hour periods until, at the 24 to 30 hour period, it was but 10 per cent. The high early mortality was partly explained by the fact that the most desperate cases were operated upon first.

Where multiple major wounds existed the policy was to perform the separate procedures over a period of days rather than have several operative teams

working at the same time.

In most cases the anesthetic of choice was nitrous oxed oxygen, and ether in a closed system, prefer

ably with intratracheal intubation. Open drop ether was valuable for patients in severe shock from aternal hemorrhage. Spinal anesthesia and pento-

thal were unsatisfactory

In combined chest and abdominal woun! the therace problem was handled first. The tran therace approach to the disphragm was most useful in treating wounds of the disphragm splicen and is registrict wounds. Paramedian incident with separation of either of the recti muscles were used the frequently. Exposure through subcostal memors proved very useful expecially in cases with inunes of the stomach liver and splicen and the hybride and splient flexibits of the colon.

The authors state that systematic examination of the abdominal contents is important. Suture of wounds of the small bowel is preferable to resection and end to-end suture was the procedure of choice fillowing resection. Enterostomy of the small

lowel should not be done.

Small wounds of the cecum and ascen ling colon were sutured and a large Pezzar catheter was paced in the cecum as a safety valve. In the transverse descending and sigmoid colon the Milail cet preferably the loop-type of colorsoms was performed. In rectosigmoid perforations, those within the pertoneal eavity were sutured with a proximal

inguinal righeid stomy to divert the local stream. In extraportionial perforations of the tectum all quate drainage with removal of the coccyal if necessary and appears and a presumal come my were dominated as a second stream.

Wound of the liver were managed by packing or the up of free mode graft. Wounds of the phoen

usually required in cheeterny

Abdominal incides were carefully closed in layers and reconcerned with sill, or wire retention solutions. Drainage of the peritorical casety was unnecessary except in call solutions of the liver.

Fortoperative care it cluded adequate highest of and the liberal in of jama and who libed to maintain libed protein levels. Warren treas raining was used it utiled in all portoperative adominal care. Pit, it mill ewa given prophulactically in the immusite postererative periodical of and toutiled in all care and is given populate trailiby in the immusite postererative periodical viation. Can't thinking were given orally. Levelilliby was used trout rely in all cares and is given partial credit for the low incidence (16 per cent) of pull many infection. For certainy wounds feetile is were rately encountered a lithis was attributed to the ore of periodilib and the sulfa drute also post operative intestinal obstructs in in the early post operative intestinal obstructs in in the early post operative intestinal obstructs in in the early post operative intestinal obstructs in the early post operative was rate.

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### GYNECOLOGY

#### UTERUS

Eisen, D., and Goldstein J : Linkodol Intravagation during Uterosalpingography with Pulmonary Compileations. Radial gr 1943 45 603

The accidental intravasation of lipiodol into the venous system of the uterus during uterosalplingog raphy has been repeatedly described in the litera ture. As a rule there were no fil effects except perhaps slight temporary leucocytosis. In rare cases pulmonary and cerebral embolism and pulmonary infarction were noted

In an attempt to study the mechanism of uniodol embolism in the lungs Sicard and Forestier in fected from 2 to 4 c.c. into the cubital vein. The liplodol reached the lungs in 5 or 6 seconds remained there for from 6 to 8 minutes and then suddenly disappeared. The only effect in the pa-tient was a slight cough. Walther injected liploids into the ear vein of rubbits. He found that practi cally all of the oil became arrested in the lungs where



Lipiodol I travasation t th aterine venous olexus and the ovarian ver The latt re-emble preters. pring filled ther entirety on the right sid t the vena cava and on the left up to and including the renal vein.

it underwent two processes. The major part was broken up into lodine and fat the lodine being er creted through the kidneys during the first \$ days as potassium folide and the fat being saponified and carried away by the circulation. A smaller part of the liplodol became phagocytosed. Walther also suggested that an inflammation may develop around fat droplets because of bacteria carried along by the lipiodol from the uterus

A review of the literature revealed that the various authors attributed the intravaution to traums of the endometrium during the injection, to excessive pressure and to an increased permeability of the receiving sinuses, such as is observed in idlopathic uterine bleedings or immediately after

menstruation.

The authors themselves noted intravasation of liplodol during uterosalpingography in a woman 25 years of age. The case is briefly described and illustrated (Fig. 1) The afternoon after the injection the patient developed a dry cough with a temperature of 102 degrees. The next day her cough increased and she brought up bloody sputum. The temperature remained high until the fourth day when it dropped to normal. The cough persisted, however and a roentgenogram of the chest on the ninth day revealed a dense patchy opacity involving the lower two-thirds of both lunars. Another rocat genogram a month later howed practically a normal

appearance in conjunction with this case the authors rec ommended the following precautions (t) uterosalningography should not be performed sooner than from 8 to 10 days after the menstrual period or any operation on the uterus (2) the position of the uterus should be determined preliminarily by the use of a sound and in case of angulation the injection should be done by properly circumventing the angulation so as to a old trauma to the endometrum (3) the pres ure of the injection should not exceed from 1 to to 200 mm of mercury a manometer being used for control and (4) the amount of lipsodol injected should be no more than is necessary to fill the uterus and tubes with a slight spill.

T LILECTE M.D.

Morris, P.: Hydrometrocolpos in Infancy—A Cause of Urinary Retention Intestinal Obstruction and Edema of the Lower Extremities. Am J 11 945 0 75

1 7 weeks old girl who had been pa sing thin ribbonlike stools with difficulty for about 3 weeks, and f r a day had only slightly wet two dispers, suddenly leveloped swelling of the feet and a pur plish discoloration of the lower extremities. Also th pre your day blood flecks had appeared in the stool and intus usception was suspected because of the presence of a mass in the lower abdomen. In addition to the large cystic mass extending upward from the publs and apparently slightly more toward the right side reaching to 2 cm. above the umbilicus, there was a peculiar bulge at the vulva, cystic in appearance, pointing anteriorly and somewhat resembling a rectocele with the distended viscus pushing into it.

At laparotomy after the bladder had been emptied by eatheterization a second mass appeared behind it. This was recognized as the distended uterus and vagna. Pressure on this mass, which was only about 5cm in diameter caused an increased tension in the vulvar bulge which was then incised externally. A considerable amount of a thin alightly milty fluid excaped and the mass collapsed, which allowed the rest of the urine to be emptied easily from the blad der. The fluid contained some white blood cells but the culture was sterile. The child died about a week later death apparently having nothing directly to do with the abnormal conduction reported.

The author thinks that patients with hydromet recolpos should not ordinarily be subjected to laparotomy as simple meason of the vaginal mem brane entirely relieves the condition. Preluminary sapiration by needle of some of the cyst fluid and in petion into the cyst of so e.e. of diotrast followed by anteroposterior and lateral roentgen ray views (as suggested by Mahoney and Chamberlain U Pediat, 1940 17, 172) will clearly establish the diagnosis of

the condition.

The author wonders if many of these patients are not escaping detection as the condition becomes more or less quiescent about a weeks after birth when the glandular activity of the vagina and cervix regresses with exhaustion of the store of circulating estrogen left by the mother. With an imperforate condition of the hymen or residual embryonic vaginal septim as the case may be, the condition may develop again about the time of puberty and lead to the later development of the not infrequently observed hem atocolpos of the adolescent girl.

TOUR W BRENMAN M.D.

Caivo M and Botelia, J: Hormonal Conditions in Uterine Myoma and the Genesis of the Men strual Disturbences in Myomstons Women (Sobre las condiciones hormonales en el mioma de diero y la génesis de los trastomos menstruales de las miomatosas) Re at pless. 661, 1045 3 87

This article is the third of a series of publications by these same authors in preceding numbers of this same journal, of which the first (Calvo y Botella Rev expan. obst. 1944 : 1) demonstrated the predominance (four fifths of the patients with myonns) of incomplete cycles that is persistent follicles and snovular cycles The second (fibil 1944, 1 165) showed that in almost three fourths of the myonations women the secretory phase of the menatural cycle did not develop These findings corresponded closely to those in the first article. In addition the reader is referred to the thesis of one of the authors (Calvo Marcos Tesis doctoral, Madrid 1943) for a

detailed discussion of the techniques employed in this series of investigations.

In the two previous articles the investigations had led the authors to believe that there is actually an inundation of the blood of the myoma patient by estrogenic hormone vis that the blood hormone is higher than normal, although the excess seems due rather to a constancy of secretion (anovular cycle) than to a high titter at any one phase. This constancy of secretion is designated by the authors as a rhythmic hyperestronism. It also seemed to them that the pathological bleeding so characteristic of the myoma has a functional origin that is it is bound up with the endometrial functional changes incident to normal meastruation.

In this report, on the other hand there are presented the shortcomings in the authors findings militating against unqualified acceptance of any such

conclusions as those just cited

The urine of 8 myomatous patients was tested for the elimination of estrogenic hormones on castrated adult white mice according to the method of Siebke and, although it is admitted that the urinary estrogenic elimination is not now regarded as a reliable criterion for inducating its level in the blood it was found that the urinary elimination was neither constant nor excessive. In only 2 instances was the titer higher than normal and even in these cases the excessive elimination was not very marked and the tentative inference is offered that the endocrine disturbances of the myoma are due rather to the continuity of follicular secretion (anovular cycle) than to an actual increase in quantity at any particular time.

In studying their material the authors found that the incidence of the various patterns of menstrual manifestations in myoma showed in accord with practically all statisticians on this subject, a rather striking correlation of figures under all conditions. In their own material there was more than 50 per ent of patients complianing of menorrhagias more than 10 per cent with metrorrhagia, 3 per cent with eumenorrhagia and 4 per cent with amenorrhag, and these proportions of characteristic manifestations were maintained except perhaps for a slight predominance of copious menorrhagias in the frankly hyperplastic endometrial specimens no matter what endometrial phase was present.

The authors therefore, conclude from these studies that the bleeding in these myomatous patients is not due to a hormonal metropathy but rather to a vascular condition. In conformity with the older theories it is believed that it is due to the power of the myomatous new growth to induce congestion and changes in the capillary walls in the trissues overlying and contiguous to it. This perhaps is dependent upon its ability to produce some substances such as histamine or histaminoid substances and the effect is perhaps more or less sustained by the poor contractifity and cavity deformation which is presented by the uterus itself

JOHN W BREMMAN M.D.

### ADDEXAL AND PERUITERING CONDITIONS.

Jones, G. E. R., and Te Linde, R. W.: The Cure. bility of Granulosa Cell Turnors. 4m J Ohn 045 50 601

Three cases of granulosa cell tumors have been reported in which recurrences developed not less than 14 years after the original operation.

All 3 patients died 18 20 and 21 years respectively following the removal of the primary tumor in spite of the fact that the tumors were well encapanlated and showed no evidence of metastasis or implantation at the original operation. One tumor recurred in spate of bilateral salpingo-conhorectomy and bysterectomy

One case, with widespread inonerable abdominal metastases, responded well to deep a ray therapy over a period of 3 years, but a subsequent recurrence of the growth proved refractory to treatment.

The total urinary estrogen values in 2 cases were not extremely high but stood within the range of values for pormal cyclic women. However the values were well above those usually found in the authors laboratory for postmenopausal women. All 3 of the patients fell into this are group at the time of the tumor recurrence. All 3 cases exhibited clinical signs of estrogenic activity at that time

EDWARD L. CORNELL, M D

Usandizata M: Tumors of the Round Litament Los tumores del ligamento redondo) Rer eres obn 1945 3 75

The author's patient was a woman of 39 years who had been married for 18 years and had gone through a pregnancies with normal childbirth in each instance. She entered the Provincial Mater. nity Hospital at Zaragoza with progressive enlarge ment of the abdomen since about 5 months pr viously and rather mild pains in the hypogastrium radiating into the lumbosacral region.

Examination revealed a hypoga tric mass some what smaller than the head of an adult person of hard consistency very firmly fixed and with an irregular modular surface. The impression of a mall retroposed uterus was also obtained. The diagnosis was that of an intraligamentary solid tumor

At operation a tumor mass was uncovered it was somewhat smaller than an adult man a heart with multiple lobulations and of firm consist new it was situated almost entirely beneath the peritoneum The mass appeared t be in direct continuity with the uterine end of the round ligament in the right side the legament passing intact from the uterus i r about 3 cm before being engulfed by the tumor ma s. The broad ligament was well preserved the tube and ovary of that side presenting a normal appearance The peritoneum was freely movable on the surface of the tumor and the latter was easily enucleated The uterine segment of the round ligament was sectioned and the enucleation carried to the region of the internal inguinal ring where a small vascular pedicle was likewise cut and tied. The tumor could then be lifted out and the exact impression was given as though the round ligament had been excited between ligaments for its entire extent. This was followed by peritonealization, closure of the abdomenand an eventiers postoperative course.

Histological examination of the tumor disclosed that its texture consisted of abundant trabeculae of smooth muscle cells in a framework of fibrone ti sue.

In extensive bibliography is appended to this report of an extremely rare form of tumor

IOTH W BRENKAR, M.D.

#### EXTERNAL GENITALIA

Oulnet A : Tuberculosis of the Valva and Cervis-Contribution to the Medical Statistic of Brazil (Tuberculose da val a e cervir-contribuicto à casulitica nacional) A brazil gin., 1945 10 1

The case of a negro woman of 34 years who had given birth to 7 full term children is here reported. It was one of the relatively rare instances of tuber culosis which attack the lemale sexual organs and one of the even rarer exemplars of the disease in which the attack was made on the cervix of the uterus. Finally it was one of the very rare cases in which the vulva was involved in the tuberculous ulcerative condition in fact the author states that this is the first instance of vulvar involvement to be reported in the medical literature of Brazil.

The patient visited the out patient department (medical division) of the Hornital Moncorvo Filho in Rio de Janeiro a year and 2 months after the birth of her last child complaining of physical and mental exhaustion and weakness, loss of weight and pains in the r gion of the lower abdomen which be came worse on exertion Physical examination at this time disclosed some disseminated subcrepitant rales in the chest but no evidence of any involve ment of the pelvic organs. A month later however the pa us had become worse, the patient entered the hospital and was assigned to the medical section, where a small amount of ascites was determined and a hemorrhagic liquid showing no trace of the Loch ha illus was asperated from the right pleural cavity l'aracentesis of the abdomen likewise yielded an ascitse fluid without trace of tubercle bacilli.

at the end of a months the effusions had cleared and the pains were gone however the vaginal discharge was very marked and the patient was sent the gynecological division. Here large irregular fixed masses were found on both sides of the cul-desac of Douglas and since one of these had begun to enlarge and soften the patient was transferred 15 days later t surgery where the intrapelvic process developed to the point where the uterus and other pelvic organs became enveloped in a single tumor

At laparotomy some time later 2 liters of caseous, purulent material rather fetid and of a yellowish green color were aspirated from the mass in the pelvis and a blopsy specimen was taken from the lining membrane of the pus pocket. On histological examination this specimen confirmed the suspected diagnosis of tuberculosis. No further surgical procedures appeared possible and the abdomen was closed

It appears that it was during this later period that there developed from the anterior lip of the cervix the indolent appearing ulcerative process with sharply punched out edges and sluggish lardacous foor which spread down the anterior wall of the vigina, and one patch about 34 Inch in diameter appeared on the internal aspect of the left labium major

Biopsy specimens from the vulva portlo vagualis, endometrium and endocervix disclosed (as depleted in excellent photomicrographs in the original article) the vascular characteristics lymphoid plasma, and Langhans cells as well as the scattered alcohol resistant bacilli of tuberculosis. The mycobacterium tuberculosis was cultured on Lovenstein medium and guinea pig inoculations proved positive

JOHN W BRENHAN M. D

#### MISCRLLANEOUS

Dujovich, A.: Elytrocele (Elitrocele) An. brasil gin. 1945, 10 116.

The elytrocele also variously known as vagunal hemia, enterocele vaginalis posterior Douglascele, prolapse of Froriep herma of the floor of the sac of Douglas, and colpocele posterior is rare but never theless more frequent than the anterior form of vaginal hernia. It is particularly important not to confound this condition with rectocele since a simple repair of the latter when accompanied by elytrocele, will usually result in recurrence. However other forms of defect of the pelvic floor usually accompany the elytrocele. It is well to be prepared to repair these at the same time.

The case history presented by the author was that of a woman of 55 years who had given birth to 3 children. Twenty nine years ago 4 years after the first accountement she had noted a protrusion of the vulva, which was painful on physical exertion. The

condition became gradually more pronounced until 19 years ago when she underwent a pelvic repair probably an anterior colporrhaphy and a colpoperi neorrhaphy—with relief for 4 years. Then the protrusion and other symptoms returned A pessary was worn for 7 years without relief and during the past 3 years the patient suffered from a sensation of heaviness in the vagina and on exertion a globular mass protruded from the vulva. The diagnosis at this time was genital prolapse colpocele, anterior cystocele, hypertrophic elongation of the uterine cervix colpocele rectocele and vaginal herma of the pouch of Douglas (enterocele)

At operation which was entirely vaginal, the anterior wall of the vagina, together with the cystocele was first repaired and the elongated cervix amoutated The incision was then carried around back of the cervical stump and the posterior surface of the latter was followed closely to guard against injury to the hernial sac. The sac, however was easily identified and freed up to its neck. When the sac was opened, it was found to be lined with the perstoneum of the pouch of Douglas and to contain a loop of the sigmoid colon. The sigmoid was pushed back through the neck a fingers in width which was then closed by a purse string suture with No I catgut and the sac itself was cut away. The closure was in turn reinforced by additional sutures includ ing the posterior surface of the cervix and the rectovaginal fascia on each side, which had been previously dissected loose from the posterior vaginal mucosa. The vaginal mucosa was then sutured with interrupted sutures of No a catgut to the posterior surface of the stump of the cervix, and the entire operation finished up with repair of the residual rectocele including the usual myorrhaphy of the levator muscles

It is now a month since the patient was operated upon although there is some shortening of the vagina she seems to be definitely cured. Indeed, the prognosis is generally good in these patients, provided that the condition be correctly recognized.

JOHN W BREDGIAN M.D.

### OBSTETRICS

### PREGNANCY AND ITS COMPLICATIONS

Dieckmann, W. J., Turner D. F. and Ruby B. A.; Diet Regulation and Controlled Weight in Pregnancy Am. J. Old., 1945 50 701

The pregnant patient must have a proper diet, but this does not mean that she should have an un limited calone intake and, as a result, gain excessively in weight. The pregnant patient does not have to eat for z of her own size. The diet must be in

creased during the last trimester

The necessary weight gain due to the physiological changes of prepancy—fettu, placents, ambotic dust uterus blood volume breasts—amounts to 67 kgm. Cheeley calculates from reports in the hiterature a gain of 6.a kgm. for the same physiological changes in pregnancy. There is no need for a total weight gain greater than 8 kgm. above the died weight. The first j months of pregnancy are characterized by either a little gain or a loss of weight. The swrape weight gain for the remainder should then be a maximum of 233 gm. (½ pound) per week.

Every patient whose total weight gain is over rook gm. does not necessarily have toxemia. Six tistles show however that the incidence of toxemia is increased in the patients who gain more than 13

If the patient a weight is ideal before pregnancy the maximum gain abould be between 7 and 8 kgm. A diet containing 1,800 calories is required. Enwarn L. Coavent, M.D.

### Lagercrantz, C. Electrophoretic Analysis of Serum in Pregnancy and in Pregnancy Toxamia. Upula lik form firk., 945 5 17

An analysis of serum proteins in pregnancy and in pregnancy toxemia has been carried out previously by gravimetric, nephelometric, refractometric, or precipitation methods. These methods have shown quite consistently that during preg neacy both the concentration of serum proteins and the albumin-dobulin ratio are lowered findings are more pronounced in toxemia, especially in cases in which there is much edema. Previous investigators assuming that the well recognized increased plasma volume of pregnancy is due largely to a plasma hydrema have suggested that the decreased protein content is in the main a dilution effect. Because this decrease in total protein is due solely to a lowered albumin they have regarded the unchanged value of the globulin as an expression of an absolute increase of this protein in the planua. In pregnancy toxemia where still lower albumin values are found it has been sug gested that these values are the result not only of further dilution but also of real loss of albumin. In the present study serum proteins were analyzed by

electrophoresis. The technique is carefully de-

Electrophoretic analysis was performed on serua from 16 narmal nonpregnant women, 9 normal programs women in the second to servant months of gestation 18 normal pregnant women in the last month of gestation, and 19 pregnant women in the last month of gestation with varying degrees of toormia. The analysis showed that

 The alpha and beta globulins increase both relatively and absolutely during normal pregnancy
 The albumin and total protein decrease during

normal pregnancy

3 Women with toxemia have a both relatively and absolutely larger alpha globulin than normal pregnant patients.

4. There is no significant difference in the electrophoretic patterns of umbilical cord serum after a normal pregnancy and after a toxemic one. Umbilical cord serum shows small amounts of alpha and beta elobulus.

The author correlates these results with previous work, although he makes no attempt to draw any

significant conclusions.

The alpha and beta globulins consist partly of lipids. It is known of course that in prepancy the serum lipids are elevated. The increase in these globulin fractions may be related to the lipems. In view of the small amounts of alpha and beta globulin found in the umbifical cond it is unlikely that the increase is caused by a transfer from the fetus

The molecular weight of both alpha and beta globulin is much higher than that of either albumin or gamma globulin. Consequently in tournis, when the permeability of the capillary walls may be pathologically increased, albumin and gamma globulin should leak through first and lead to a relative increase of alpha and beta globulin. The absolute increase, however must be explained by some other factor than filteration above

L. JAMES TALBOT, MLD

Co Junta Lateril and

Gimeno, A. M., and Orengo, F.; Capillaroscopy in the Toxemiss of Pregnancy with Special Refersures to Differential Diagnostic (i.e. capilaroscopis en les tovemiss de embarazo, con especial referencia al diagnostico differencial). Rev apra. etc., 947

3 2.

This is the conclusion of an article begun in the light issue of this same journal in which details of the technique and the criteria established by the au thors in judging the results of their observations will be found

The authors examined capillaroscopically 100 cases of toxemia, including 3 of chronic nephritis, 3 of vasculorenal disease, 22 of essential hypertension 47 of mild pre-eclampsia 17 of severe pre-eclampsia.

and 5 of celampaia. These capillaroscopic examina tions were made in the course of a broader investigation employing numerous other tests and methods of study such as blood pressures studies and studies of edema, of the effects of the administration of pitui tin and of congelation of the hematecrit findings of albuminuria and of sedimentation, and the results were correlated. When possible the observations were made both before and after delivery

Capillary architecture does not show sufficient modification to permit of differentiation between the mild and the severe pre-eclampsias. Acute nephritis is distinguished by marked anomalies of form such as undulation serpentine formation intercressing, anastomosis visibility of the subpapillar plerus of the blood vessels. There are no characteristic al terations in the picture of essential hypertension. In chronic nephritis and in vasculorenal disease deviations of form are, in the first instance scarce (undulation, some serpentine deformities and at times visibility of the subpapillar plexus). In the second condition there are even fewer abnormalities consisting solely of a certain amount of diminuition in the number of capillaries per field each vessel being somewhat narrower on the whole.

In general it is possible to demonstrate a relationship between the clinical picture and the capillary findings however incongruities are frequently present. The blood current in acute nephritis can show findings as poor as those in eclampsiz, and by the same token, much worse than those in chronic nephritis In cases of essential hypertension and in vasculorenal disease there is a persistent constriction of the vascular bed with changing blood current velocities and at times an accelerated or even

violent circulation

The postpartum capillaroscopic examinations result in two classifications the genume toxemiss (pre-eclampsis and eclampsis) and a group comprising all the other processes cited (chronic). In the list group the authors observe a total recuperation or at least a tendency toward recovery in the second an established condition with slight modifications persists. The value of a careful postpartum revision for substantiating the diagnoss is seen.

The authors consider capillaroscopy a diagnostic method, which sids in the differentiation between genuine toxenius and vascular disease or a chronic kidney condition especially when employed in the postpartum period. It also possesses a limited but evident value in prognosis and may serve as a guide in bringing out the effectiveness of therapeutic methods the authors having frequently observed the improvement with diet with magnesium sulfate and especially with hypertonic glucose solution. Juny W BELEGAM M.D.

Davis, L. J., and Forbes, W: Thiouracil in Pregnancy; Its Effect on the Fetal Thyroid Lancet, Lond, 1945, 249, 740

A case of mild thyrotoxicosis in a woman who was treated with thiourseil prior to and during preg nancy is presented. She died in the sixth month of pregnancy The cause of death was uncertain de-

spite autopsy examination

The thyroid gland of the fetus was enlarged and hyperactive, as compared with a presumably normal gland from a premature infant, and showed histological evidence of considerable functional activity It resembled the gland of an adult receiving too much thiouracil. It is suggested that thiouracil acts on the fetal phyroid after passing through the placents. The administration of thiouracil to pregnant women and probably to nursing mothers demands caution. George Edwards, M.D.

Beerman, H. and Ingraham, N R Jr : Recent Advances in the Management of the Syphilitic Pregnant Woman Med. Clis N America, 1945 29 1463

There is now general agreement that syphilis is exclusively transmitted to the fetus by the mother Most evidence shows that the fetus is infected in the later months of pregnancy and not shortly after conception.

Routine blood testing in prenatal patients becomes a matter of great importance because op per cent of the women are unaware of their infections. In the expenence of the authors there is no evidence that pregnancy impairs the sensitivity or specificity of the tests.

In the treatment, drugs with a strong spirillicidal action must be used These are necastiplicamina, arxenoxide and periodilin. Bismuth and mercury alone are not effectual. An outline for the use of these drugs is given, with the greatest discussion being devoted to peniciliin. Treatment began at the fourth month of pregnancy and continued at weekly intervals to total not less than 4 gm. of necarphens mine, or the equivalent of arsenoxide with or with out bismuth subsalicylate. Pregnant women tolerate arsenical and heavy metal treatment well but a urine examination and blood pressure determina tion before each treatment is important.

Penicillin therapy is the same as for the nonpregnant adult. The spirochaeta pallids was seidom found in the open lesions longer than 12 hours, and the lesion itself was completely healed in I week. The therapeutic shock at the beginning of treatment may be harmful to the fetus. A large percentage of the women develop abdomind pain, gastromestinal disturbances and on several occasions presented symptoms of threatened abortion. For this reason the initial dose is reduced for the first 48 hours. A total dosage of either 1,200,000 or 2,400,000 Orford units of sodium penicillin is astificatory both to prevent infection of the fetus and to cure the duesae in the mother. This total dosage is given intramuscularly 2000 outils every 3 hours with a reduction during the first 8 hours. The total treatment course takes 8 or 9 days.

Twenty-seven of the women treated at the University of Pennsylvania Hospital Philadelphia have thus far been delivered and their babies followed up

for periods which vary from a months to a year with no evidence of syphilis

CATHERINE B HEPL M.D.

# LABOR AND ITS COMPLICATIONS

Resnick, L.: Spinal Analgesia in Operative Obstet rica Brit. M J 1945 2 7 2

Although the safety of spinal anesthesia for ceneral surgery has been generally accepted, its use in obstetrics is still considered dangerous. The author reports a series of 137 cesarean sections and 256 operative vaginal deliveries done under heavy nu percain (1 in 200 in 6% glucose in 3 c.c. ampules) spinal anesthesia.

Premedication was given to all women who were to be delivered by cesarean sections it consisted of omnonon gr 1/3 and scopolamine gr 1/300, given about 45 minutes before operation, and in addition, atropine at 1/100 and ephedrine at 1 for varinal deliveries most of them had had some premedication during the labor but were given cubedrine or 1

The dosage for cesarean sections varied from 1.2 to I 5 C.C. of the solution and for vaginal deliveries from o 5 to 0.5 c.c., which gave anesthesia to lust

below the umbilious.

The indications for and the types of cesarean section performed are summarized 75 per cent of the sections were of the lower segment type. Of the 2x6 vaginal deliveries 136 were made by means of the outlet forceps, 108 by midforceps, 8 by high forceps, 6 by breech extraction, and 4 by craniotomy Rotation of the head was performed 167 times

No maternal deaths occurred in the cesarean group, while a of the patients delivered from below died (one because of pulmonary embolus and the other following sulfonamide therapy for pyelitis) in neither case was the anesthesia responsible for the death. Seven (5%) of the cesarean babies and 34 (13%) of those delivered from below died but none of these deaths could be attributed to the anesthesia.

The author considers the following to be the advantages of spinal anesthesia

# For the mother

- I It is safe when inhalation anesthesia is contra indicated.
- 2 It is safe in pre-eclampsia and eclampsia. It is safe in essential hypertension.
- 4 Uterine atony and hemorrhage are rare
- 6 Pulmonary complications are rare. 7 Postoperative discomfort is absent.

# For the physician

The technique of its use is simple

- It may be used when skilled anesthetists are not avallable.
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# I ROBERT WILLIAM M.D.

#### NEWHODN

Wiswell, G. B.; Anemias of the Newborn, Cond. M Au J 1945 53 555-

Anomia is defined as any state in which the hemoglobin is less than normal in proportion to the blood volume. This state can arise from several cames such as blood loss, failure of cell formation or bemoglobin, excessive cell destruction or combinations of these.

These anemias are reviewed under four headings Anemia due to kemorrhage Hemorrhage may be suspected if the red cells drop to 4,000,000 with a corresponding reduction in hemoglobin. It is a hypochromic type becoming microcytic if the loss continues. Nucleated red blood cells appear and the reticulocytes increase. The leucocytes increase to from ro,000 to 30,000 and the platelet count is normal or raised

Traumatic hemorrhage usually occurs in the first two days and may be severe enough to cause anemia.

The two most common diseases of the newborn

giving rise to spontaneous bemorrhage are Hemophilia which is rare. The clotting time may be prolonged for hours but the blood eventually clots. Treatment consists of frequent transfusions.

Hypoprothrombinemia. This is very important and takes the form of constant ooring. It usually appears between the second and eighth day Marked increase in the prothrombin time alone characterizes Vitamin K administration to the this condition mother in labor or intramuscular injection of the newborn is remarkably efficacious in preventing of

benefiting this condition. Anemia of infection The hematopoletic systems of babies vary in their vulnerability to infection Anemia lowers the resistance to infection and infec tion aggravates the anemia. Severe pyogenic infec tions, septicemia pyelonephritis, and pneumonis may cause a serious drop in hemoglobin. Streptococcal and bacillus coll infections are more likely to cause anemia than streptococcal infections although a hemolytic staphylococcus may cause severe anemia

even of an aplastic type. Congenital syphilis is the chief offender of the

chronic injections. Acute congenital hemolytic anemia may rarely

follow infection and sickle cell anemia, occurring only in negroes, may be precipitated by infection. Repeated transfusion is the treatment of choice

and if the anemia persists there has probably been some destruction of the bone marrow

Anomia of prematurity This type is characteristic of all immature infants and its severity is governed by the state of maturity. The anemia may not reach its maximum for from 8 to 10 weeks and at 2 months a gradual improvement sets in. Various workers have shown that iron is not directly involved in the causation of this anemia. Immaturity of the hemopoletic system makes it difficult for these infants to perform postnatal adjustments and to recover the normal volume of blood and its constituents.

In the early stages it is a normocytic normochromic anemia. Microcytosis occurs later The

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These babies are potential bleeders and they require vitamin K more urgently than normal infants. Treatment with iron is of some use only after the third month at which time there is a natural spon taneous tendency toward recovery Transfusion has only a transitory effect and is used only to combat infection and complications.

Anemias due to hemolysis These are for the most

part related to the Rh factor and its workings. The author gives a good review of the mechanism by which Rh incompatibilites cause hemolysis of the blood cells in infants and subsequent anemias. The hemoglobin may fall to 20 per cent and the red blood cells to 1,000 000 The treatment is multiple transfusions of Rh negative blood.

HARRY FIELDS, M.D.

# MISCELLANEOUS

Tompkins P : The Timing of Ovulation with Basal Temperature Graphs Med Clin. N America 1945 19 1415

Graphs of the daily basal body temperature have been used by the author as an index to ovulation in cases of sterility Special graph paper or improvised paper is suitable. The patient is instructed to take her temperature rectally with an ordinary clinical thermometer each morning upon awakening and before rising drinking eating and smoking. It is to be recorded if any acute infection exists at the same time although marked upper respiratory in fections produced practically no change in the rectal temperature The results of this method concur with the established theory that ovulation occurs on the fourteenth day before the menstrual period regard less of the intervals of the periods.

The time of ovulation is marked by a rise in rectal temperature, which is sustained for several days and is usually preceded by a slight fall in tempera ture. If intercourse occurs near the time of the temperature shift there will be a better chance of conception than if intercourse occurs only at other times in the cycle. The span during which the ovum is susceptible to fertilization is believed to be from 12 to 24 hours The author states that the length of pregnancy is 266 days rather than the accepted 280 days.

The reason for the temperature shift is not established Two suggestions are offered (1) that progesterone elevates the temperature and (2) that during the preovulatory phase the temperature is

depressed by estrogens.

The basal body temperature graphs can be used for the following (1) to determine the time of man mum and minimum fertility (2) to determine the time for artificial insemination and endometrial biopsies (3) to aid in securing early human ova (4) to help in evaluating the effectiveness of treat ment designed to produce ovulation, especially x ray therapy and (s) in occasional cases to predict the date of delivery CATHERDOR B HESS, M.D.

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# GENITOURINARY SURGERY

## ADRENAL KIDNEY AND URETER

Peters, J T : Origin and Development of a New Therapy for Grush Injury Transfusion Kidney and a Certain Number of Other Diseases, Ads mai. reset 1945 123 90.

Considering the fact that a part of the kidney function is a mechanical filtration process the author constructed an artificial nephron of glass and rubber By means of this apparatus it could easily be demonstrated that not only oligoria and anuris but also polyruis could be indisted by a purely mechanical device. The indication annuts was produced without any obstruction, as a result of increased intrarenal pressure which caused a decrease of the effective filtration pressure

The presence of an increased intrarenal pressure in vivo is readily deduced from certain pathological facilities. Thus the obstruction of the tubeles by blood clots, cell detrims and crystals is often found at antopay to be present only in a small part of the kidney or it is altogether absent. An obstruction, therefore is unnecessary for the development of anumia.

In mercury poisoning crosh injury transfusion kidney and several other diseases oligaria or sauria sanciated with hyperactorna and uremia is the important syndrome. For the treatment of these conditions, decapsulation of the kidney is recommended, on the assumption that the condition is the result of increased intrarenal pressure. This should be considered an emergency operation, and should be done on the fairt day that the syndrome develops

Uremis caused by glomerular destruction, how were must be sharply differentiated from the uremia caused by increased intravenal pressure. The former cannot be cured by lowering the intravenal pressure by a few millimeters of mercury. In the latter decapsulation, distreties and pressor drugs are now whichy used either separately or in combination, and apparently with success. Success Kaser M.D.

Abramson, D. J.: Renal Typhoid Fever; Presentation of a Case of the Primary Type, J. Urel. Balt., 945-54-452.

A case of primary renal typhoid is presented. It is of additional interest because of the presence of calculf and pyclonephrous. Enteric typhoid had been consistently excluded by negative clinical finding, Widsi tests, and stool and blood cultures.

Emphasis is placed on the necessity of careful bac teriological examinations of routine urmany cultures, the lack of significance of Widal tests in previously immunised individuals and the value of conservative treatment. The role of sulfonamides in renal typhold deserves further study

Both primary and accordary renal typhoid are discussed. The epidemiological significance of ty phold disease of the kidney and of the carrier state is emphasized Joen A. Lozz M.D

Jacoba, A.: Tuberculous Disease of the Kidney Glarges M J 1945, 144: 161

The author presents a set of concepts for dealing with tuberculous disease of the kidney based on a series of over 350 nephrectomies and a further natotated series of nonperated cases of renal tuberculosis. He divides the disease into three main clinical groups tubercle bacillaria without urfurny symptoms renal involvement with signs and symptoms confined solely to the urfuracy tract and no other colorious tuberculous focus and renal involvement appearing subsequent to the occurrence of an extra renal larlow.

Tubercle bacilluria according to the author requires only follow-up urtological camination. In many cases the minute renal lesions accounting for the bacilluria will heal, in others, the microscopic foot will progress and the accord clinical condition will develop that of obvious renal involvement in unlitateral disease nephractomy is lodicated. In bilateral involvement the operation is contradiated unless the involvement on one side is minimal and it is believed that removal of the badly infected kidney will materially improve the patient agencial condition. In cases of renal toberculosis complicated by extravenal foci the more serious life taking lesions are greated precedence in the institution of treatment.

Intractable tuberculous cystitis, which has failed to show improvement over a reasonable period of time following nephrectomy will require diversion of the urinary stream by pephrostomy cutaneous arcterostomy or transplantation of the ureter into the bowel.

CLARDER V HOGGER, M.D.

Ladewig, P., and Eser S : Malignant Tubular Adenoma in a Horseshoe Kidney; Ita Significance with Regard to General Cancer Pathology J P li. Bad Lond., 945, 37 495

A case of malignant tubular adenoma arhing within a borschee kidney in described by the au thors and discussed with regard to fits bearing or general cancer pathology. It is concluded (i) that the tubular adenoma coght to be regarded as ancer matrix according to Cohnheim's theory of displaced embryonic tissue. (s) that such displaced embryonic tissue (s) that such displaced embryonic tissue as well as hyper regenerative hormonal and other tissue disturbances merely provide zones of potential growth teatability (3) that in these zones. Irritation in the widest conception of the term may induce the fatal event of the cancer cell s birth as a somatic mutatlom and (4) that Cohnheims theory and the irritation" theory of cancer are not mutually exclusive but complementary

The most widely accepted view is to regard the tubular adenoma as the result of an abnormality in fetal development at the time when the ureteric bud joins up with the metanephrogenic blastema and induces its differentiation and growth. In this stage certain elements of the tissues involved may fail to establish contact and become excluded from the co-ordination of further development. They are left free to unfold their remaining growth potency in unusual ways. This theory finds support in the authors case from the peculiar combination of adenoma and horseshoe kidney. It is in fact generally agreed that horseshoe kidney is due to unusual growth impulses of the metanephrogenic tosues whereby the bilateral blastemas come into collision. In view of this the authors believe that they can accept the dysontogenetic nature of the tubular adenoma.

The tubular adenoma with its dysontogenetic origin is only a peculiar ground on which the malig nant change has taken place. In the same way adenoma of the currhotic liver predisposes to malig nancy as do adenoma of the prostate certain forms of adenoma of the female breast and in rare mstances adenoma of the thyroid gland. The cause of the formation of these different adenomas is the potentiality for prospective growth in existent embryonic tissue hyper regenerative power in impaired tissue or even unbalanced hormonal atimulation. But none of these can be regarded by themselves as responsible for the induction of malignancy This is shown by the uneven ratio between the frequent occurrence of adenomas and the relatively rare incidence of their malignant transformation. Moreover, in accordance with recent research on the subject we are justified in assuming that spontaneous cancer development is the result of an incidental and peculiar combination of various factors and influences no one of which necessarily bears directly and specifically on the final result. JOSEPH K. NABAT M D

Bowle C. F., and Bors, E.: Primary Carcinoma of the Ureter J Urol Balt. 1945 54 434-

Primary carcinoma of the ureter can still be considered a rare tumor although an increasing number of cases have been reported during the past decade. The total number of reported cases up to date is 175.

A case of carculoms of the areter complicated by conflicting the reported of the operative technique is reported. The operative technique is reported in detail because certain well recognized general surgical principles used in attacking malignant tumors anywhere else in the body were employed. No prionty is claimed on the technique.

The principles carried out in this case were (1) opening of the pentioneal cavity for evidence of spread of the tumor (2) beginning dissection in healthy tissue above the tumor and (3) after the tumor was reached from above, dissection on the bladder side with the electrosurgical knife the whole

tumor being removed en masse. The kidney and remaining portion of the ureter were removed 4 months later. No evidence of tumor was present Cystoscopy revealed a normal bladder with no evidence of recurrence.

JOHN E. KIRKPATRICK M.D.

# BLADDER, URETHRA, AND PENIS

Krafka, J Jr: The Elasticity of the Human Uri nary Bladder J Urol Balt. 1945 54 438

Incidental to studies made on the elasticity of the human aorta tests were run on the elongation of standard strips of urinary bladder. The technique used was that previously described in which in creating weights applied by the gravity pull on a carriage running on an inclined plane, exert a stretch ing force on the specimen and automatically record the relationships. The machine used was the Scott serigraph, which is commonly employed in fabric laboratories for measuring the elasticity and the tensile strength of thread

It is common textbook knowledge that the detru sor serves as the principal agent in the emptying of the bladder. The urologuets are also aware of the character of the pressure curves developed during the filling of the bladder. The commonly accepted value for emptying of the bladder is between 20 and 40 mm.Hg upon which is superimposed an addi tional volitional pressure produced by contractions of the abdominal muscles and the descent of the dia phragm which brings the total intravesicular pressure to approximately 74 mm. It is also observed that the pressure developed upon the addition of successive increments of fluid to the bladder volume is initially high but immediately levels off to fixed values proportional to the volumes prevailing. These reactions are commonly interpreted as due to balance in muscle tonus and the primary and secondary pressures are used as indications of hypertonicity or atony in various pathological states.

That such pressures prevail at other sites in the body has been well established Hamilton. Wood bury, and Harper (1936) have made a study of cough and strain upon the blood pressure and upon the cerebrospund fluid. Intracranial pressure may be raised so mm Hag and there is one record of a blood pressure of 380 mm, due to strain.

Woodbury Hamilton and Torpin (1937) in an analysis of intrauterine pressure have shown that 70 mm. pressure can be transmitted to the intragss tric pressure and a like equivalent to the pregnant uterus.

Muschat (1935) noted a maximum of 60 mm Hg
pressure in the bladder of the tabetic with a para
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pressive in the bladder of the tabelic with a para lyzed bladder wall, but an intact abdomen. Another concept, of course would need to be con sidered in a corollary to the one just developed namely the protection of the unterpracing the

sidered in a corollary to the one just developed namely the protection of the ureters against these high intravesicular pressures. Wuellenweber has made a study of the pressure prevailing in the kidneypelvis at various intravesicular pressures. The for mer is always lower than the latter. Thus at 120 mm, bladder pressure the pelve pressure is 70 mm (water) at 350 it is 200 mm. This factor however is not so significant as the main one alone the angulation of the ureter and the muscles of Waldeyer seem to provide a competent mechanism to prevent transmissal of the high pressures to the ureter.

That the musculature of the bladder does main tain a definite tome is acen in the work of Holmes (1933) on the paralyzed bladder. Injury to the cervical, dorsal, or sacral cord results in an atomic bladder with a characteristic volume pressure re lation on filling. His figure 2 shows a deninte filling emptying curve which are reciprocals. His figure 2 shows one of the features noted by Laugnorthy namely a thany straight line rise followed by a rapid return to a base line in the course of a few minutes.

The effective stimulus to the emptying of the bladder is commonly assumed to be tension in the bladder wall. Free nerve endings and pressure corpuscles have been described, but it is difficult to see how these can in one instance give the sensation of fullness then urgency and lastly pain. If the simple assumption is made that the tonus of the muscle develops and mediates the semation a rea sonable opinion is at hand. Hypertonic bladders empty at small volumes atonic bladders store tremendous volumes of urine either under pathological states or in the last months of pregnancy | Irregular contractures are seen normally at 400 c.c. volume and spontaneous contractures are noted after the steep parts of the cystometrogram curve. Curves are materially affected in the case of megacolon. How these factors could be applied to simple nerve end ings of to pressure corpuscles is not clear but they would all be effective in muscle tone. Smooth muscle must act as a sensory ending to mediate its own reflexes either local or central

The percentage stretch of standard strips of unnary bladder have been measured and Young's modulus calculated. The values range from 0.488 to 4.840 dynes per centimeter square x to<sup>4</sup>

The classicity curves for the bladder have been compared to those for the aorta. The character of the curves is essentially different that for the aorta is a geometric curve, for the bladder a straight line curve. Within the limits of the test, the distensibility of the bladder is not checked by collagenous fibers such as are seen in the aorta.

Calculations are presented which equilibrate the atretching forces against manometric pressures as noted in the bladder by other investigators using the cystometer

The theory of muscle function in the bladder is discussed. The primary function of bladder empty ing for the detruour as accepted. Secondary functions are 3 in number. The first of these is to provide an elastic membrane which can adjust bladder volume to bladder pressure. The second function is to provide a local elastic mechanism to adjust of the accessory pressures impressed on the bladder by cough and sirato. The bladder considers the muscle as

a sensory organ for the mediation of the stress sense as a attinuous to voiding Jone E. Kirkentrick, M.D.

#### GENITAL ORGANS

Heyman, A., Beeson, P. B. and Sheldon, W. II.; The Diagnosis of Chancrold. J. Am. H. Att., 1945, 179, 935

The methods employed at present for the diagnosis of chancold are far from satisfactory. Current carbooks Indicate that accurate diagnosis can be based on the clinical features on the results of attness, or on the camination of stained smears. Most venereologists, however know that each of these methods is subject to major indications and errors. Actually at present the diagnosis is usually based on negative dark field caminations for spirochets, and on clinical improvement after the institution of sul consmide therapy. The establishment of reliable criteria for a positive diagnosis of chancrold would impressionable be of value.

The present article is a report on the relative efficiency and usefulness of a number of diagnostic procedures in chancroid. These findings were obtained during an intensive study of a group of 125 patients suspected of having either chancroid or trumboursulous venerum.

Appositive dagnoss of chancool was made in to of them. Of the various methods, blopy appears to be the mort efficient single method of diagnoss and can be depended on to give a diagnosis in over 10 per cent of the cases in which it is applicable. Its use is limited to cases in which there are primary gmittal lesions. The removal of tissue for biopsy is in most materies as simple procedure, well suited to out patient work. It is undestrable however in patients with small telesions because of the pain involved.

Cultural demonstration of the Ducrey bedills can be accomplished in at least 15 per cent of all cases. The technique is not difficult and can be carried out by a competent technician. Culture is less likely be successful in advance! Issions which are heavily contaminated with other bacteria. It is the commeans of obtaining a positive diagnosis in patients

with buboes but without primary lesions. Diagnosis by means of direct amears of genital lesions is possible in approximately 50 per cent of the cases. This method has the advantage of simplicity and immediate of diagnosis. Unfortunately, it is likely to be useless in advanced lesions, in which there is a beay y growth of other bacteria.

Autoinoculation has several disadvantages and does not take with sufficient frequency to make it of

value in routine work.

The skin test for chancrood should never be relief on as the sole method of diagnosts although it may be of limited value as an adjuvant to other procdures. In this group of 6e proved cases of chancrold, positive skin tests were found in only 46 (77 per cent). A further disadvantage lies in the fact that a positive skin reaction persists for many years elter an infection and therefore may not be significant in

The diagnosis of chancroid can in the majority of reference to the present illness cases be established by suitable laboratory pro-

# Lazarus, J A.: The Significance of Spontaneous Hematuria Associated with Hypertrophy of the

Prostate J Urol. Balt. 1945 54 531

Spontaneous hematuria is not infrequently an outstanding symptom among patients, with pros tatism and in certain instances it may be the chief complaint. The hematura may vary from the companie. And memacuna may year mon mer presence of a few crythrocytes to the high power held (occult blood) to massive bleeding which may at times assume slarming proportions due to the prostate itself or to conditions which are extrinsic to the prostate, such as a cystitis secondary to and aggravated by urinary retention vesical renal, and ureteral calculi tumors of the bladder or in vesical diverticula tumors of the kidney hy dromphrous and scute or chronic glomerulone

Since the hematuria is due so commonly to the prostate itself the urologist is frequently too casual in his examination after establishing the presence of phritis a protestic hypertrophy If he then proceeds to reform a prostatectomy under the mistaken notion that the bleeding is due to the prostate, when in reality it is due to a coexisting renal tumor or so ne other condition which is unrelated to the prostate

The author is therefore, of the opinion that a the outcome may be disastrous. complete urological study is indicated in every case

of prostatic hypertrophy with hematura. Although many urologists have citablished an aversion for one reason or another to performing cystoscopic examinations upon their prostatic patients the author believes that cystoscopy should be carried out in these cases whenever it is tech nically possible. He believes that the cystogram and other indurect methods give madequate information In addition to providing direct visualization of the region to providing direct visualization of op-veilcal neck and lumen, cystoscopy gives the op-portunity to catheterize the ureters and to take retrograde pyelograms in the event that no obvious cause for the bleeding can be found in the bladder or

FREDERICK LIEBERTHAL, M.D. in the prostatic urethra.

# Ferguson J D and Pagel W Some Observations Buson J D and Page! W : Some Unservations on Cardinoma of the Prostate Treated with Eartogens, as Demonstrated by Serial Biopsies.

The authors carned out repeated biopsies by transurethral resection in a small number of patients with cardnons of the prostate who had received the testrogens for from 6 to 30 months. They datin with carcinoma of the prostate who may receive the carrogers for from 6 to 30 months. They distinguish two types of tumors those which arise in attrophic thems to the carrocket take of an otherwise attrophic thems to the carrocket take of an otherwise attrophic thems. two types of rumors mose white all the control of t normal gland and those which develop secondarily in a gland presenting benign hypertrophy

latter are usually latent and are discovered during routine microscopy of the enucleated gland. The former are more common, and have usually extended by the time the diagnosis is made. All of the ma

tenal studied was composed of this type.

The authors took a careful history studied the rine aurinors cook a careful majory angued me urine for infection, tested renal function and repeatedly estimated the serum acid phosphatase. Anteroposterior views of the lumbar spline, pelvis, and upper ends of the femura were taken before and Occasionally intravenous urosucer made. Four of the 5 cases were treated with stilbestrol and I was treated with dienestrol after treatment. The Gershom Thompson cold punch was used and biopsy specimens were taken from the posterior quadrant of the prostatic urethra immediately above duscussus of the president and manufacture and the vertimentanum Coagulation hemostasis was

The studies showed that in addition to an apused as infrequently as possible, and shudad showed that he southern to an appearant reduction in the number of tumor units in the later sections there were cellular changes such as a diminution in the size of the nuclei measured quantitatively There was a regressive change from more cellular type of growth to a scirrhous form. In later sections there was again a diminution in the size of the cell nuclei with concentration of chromatin pyknosis and vacuolation of the cells DAVID ROSENSLOOM, M.D.

# Muschnt M : Osteltis Publs following Prostatectomy J Urol., Balt., 1945 54 447

The condition described is rather unusual. It was hist presented as an entity by Beer in 1924. Since urse presented as an entry of the first presented as an extensive of them an occasional report is found under the title of periostitis osteitis publs or osteochondritts depending on which thate seems predominately af rected Osterlis publs appears as a distinct disease entry with a more or less characteristic course entity with a more of the contract to the cont tuberculous osteomyelitis. It occurs in a small num ber of patients following operations upon the urnary ber of patients 1010wing operations upon the urnary bladder especially after prostatectomy. It is an inhammatory process of the bone which begins in the amount of the bone which begins in the support of the bone which begins in the the symphysis pubis and gradually involves the one sympays pure and gradually involves the multi-rami all the way down to one or both ischill this inflammatory process spreads via the perior this inflammatory process. teum to the variously attached muscles of the pelvis equal to the various and levator and expectably the obturator internus and levator and keeping them in a spastic state Aschner describes keeping them in a spasue state Ascaner describes the characteristic clinical picture most graphically. The pain is intense and disabiling in its effects. It

forces the sufferer to lie down and when down he cannot get up nor turn from side to side, except in

The chology of this condition is obscure the The ethology of this condition is obscure the clinical picture with its symptomatology however is clear and follows a definite pattern. This pattern is clear and follows a fear and agony is practically identical in every case from the onset is practicently securious in visity base around the patient of the disease until clinical cure ensures the patient of the casesse until cunical cure ensures the patient going through a period of physical agony lasting from \$10 12 months Two cases of ostellis publis are from \$10 12 months Two cases of ostellis publis are from 3 to 12 mounts and a summary of the lew cases from the literature with a discussion of the etiology symptomatology clinical findings, x ray studies pathology therapy and prognosis, is also included

As in every other disease in which the sufferings of the patient are very great and prolonged various therapeutic agents were tried. The most frequently used therapy was disthermy baking and massage. Note of these therapeutic procedures beloed in the slightest. Most patients claimed that the dathermy aggravated their patients claimed that the dathermy aggravated beit patients. Any therapy was found uscless Application of a body cast is always suggested by the orthopedic surgeon who believes, and rightly so that immobilization of the pelvid by a solid body cast will relieve the agony of pain. The patients however are very intelerant to a body cast.

It is the author's conviction that the disease is self limited and that surgical intervention is not required but if an abscess does develop it should of course be properly drained Penicillin (4,000,000 units) was used in case a without any subjective improvement whatsoever but it may have caused the absorption of the inflammatory lumps near the uchii. Sulfa drugs were tried without influencing the condition one lots. Any manipulative procedure to hasten the recovery is strongly contraindicated it only aggravates the condition and stirs up local traums, thus actually spreading the disease process and delaying the recovery. In a case reported by Barnes the patient submitted to the "adjustments" of a chiropractor for several months. The adjust ments were usually followed by chills and tempers ture as high as 105, and the patient was told that these reactions were supposed to be very beneficial. The majority of patients become so apprehensive that before long one gets the impression that they are greatly exaggerating their pain. The physician therefore, is frequently tempted to force early ac tivity and to encourage the patient to get out of bed and move about. The author found such forceful actions detrimental to ultimate recovery which was retarded for many weeks. He states that "whenever such activity is contemplated another x ray study will usually disclose that instead of improvement the process is at its worst and absolute rest is indicated

Proposis The ultimate outcome in all cases is good There is no spread of the disease to other structures or organs. The only complication is an occasional aboves formation with restitution after diainage. The only demonstrable sear is the complete outlieration and ankylosis of the symphysis. This, fortunately remains symptomicss and the patient resumes his normal life.

JOHN E. KIRKIMTEICK, M.D.

Bishop, P. M. F. i Studies in Clinical Endocrinology. The Management of the Undescended Testicle. Gey'. Herp. Rep. Lond., 1945. 94. 12.

The author emphasizes the importance of close co-operation between the endocrinologist and the surgeo in deciding which form or combination of forms of treatment of undescended testicle will be most effective and states that the decision should be based upon the individual situation present in each case. In his terminology the word testicle" is used in its literal sense, i.e., a little testis. He describes the mechanism of normal testicular descent as or curring in three stages - shdominal canalicular and extracanalicular - and extensively reviews the literature to discuss the various causes that have been postulated to account for incomplete descent. These are fetal peritonitis defective development of the transversalis fascia intercolumnar fascia, cremasteric fascia or muscle abortening of the cremaster muscle because of too powerful contraction, short ening of the processus vaginalis or of the cord structures, absence of the external ring and absence of the entire inguinal canal including both internal and external rings. Maldescent is often found to be associated with other physical and mental consenital deformities. The incidence of various positions of arrest, as described by various observers, is dis-CHECK!

Apart from the mechanical factors tocklent to body growth that play a role in the normal deserts of the testicle, chorisoing consideration is responsible endocrine factor. It causes enlargement of the testicle (inclinetty a mechanical factor) stimulates the development of all the connective tissue elements associated with the testicle in its descent, and therefore elongates the cord structures and, by its action on the intertitidal tissue of the testicle stimulates the secretion of androgen which "secondarily causes full development of the sexual apparatus, the assisting the descent of the testicle" (Molen, d Ymour and Gustavam quoted by the author)

d Immor and Giniaryon quoted by the author). A portion of the author's cases support the some what controversial view that androgenesis is if lected by maddeacent the author is in full agreement with other writers that spermatogenesis is producedly affected. He also believes that choosing gonadotropin, although it may attendate androgenesis has no effect on spermatogenesis.

The evidence both direct and indirect, for spon taneous descent of the testicle after birth is reviewed

with the conclusion that it does occur Complications and sequelae incident to an descended testicle are pain, vulnerability to traums, infection, hydrocete torsion synchological effects and malignant degeneration. However endocrine or surgical procedures for inducing descent do not seem to diminish the possibility of mailignancy

From a surgical point of view cases may be

classified into three groups

Surgery of the atrophied terticle i.e., removal to prevent possible malignant changes orchidopsy for commetic and psychological reasons or either procedure to avoid the liability of traums or tornion. Surgery of the testicle with a deviated or impected

Surgery of the testicle with a deviated or impeded descent, in which the problem is porely a mechanical one and consists merely of obvisting the difficulty caused by fibrous bands adhesions, or bernial in rolvement. The best surgical results are obtained in this group subject to the author's arbitrary quali fication that the patient should not be older than 10 or 11 years

Surgery of the testicle with a delayed descent which is rendered difficult by the problem of pre-

serving the blood supply of the testis

The optimal age for endocrine therapy must be determined because (1) overdosage at an early age may lead to premature puberty (2) the tissues are more responsive at the time of puberty and (3) the longer a testicle is left undescended after spermatogenesis begins, the greater the danger of irreparable damage first to the seminiferous tubules and later to the interstitial tissues. The criterion for dosage is the tendency toward excessive androgenic de velopment. Most authors cited believe that endocrine therapy should not be continued for more than a few months. Abdominal testicles are not likely to respond to endocrine therapy canalicular testicles are more responsive in a high percentage of cases (60 per cent in the cases cited by the author) and extra canalicular testicles are difficult to evaluate and are therefore excluded from the author's analysis Ad verse effects of endocrine therapy employed in proper dosage were not noted by the author

The conclusions derived from this study are (1) the extracanalicular testicle is a surgical problem (2) the canalicular testicle is primarily an endocrine problem and should be treated surgically only after endocrine therapy has falled or when there is a complicating mechanical impedance and (3) the abdominal testicle is unlikely to respond to either method of treatment.

CLARKET V HORODE, M.D.

Vermeulen C. W and Hagerty C. S: Torsion of the Appendix Testis (Hydatid of Morgani); Report of 2 Cases with a Study of the Microscopic Anatomy J Urol Bult., 1945 54 459-

The observation of 2 cases of torsion of the appendix testis by one of the authors in a limited and brief urological experience led the authors of this article to believe that the condition is perhaps more common than reports would indicate. Unless it is realized that the severity of the symptoms produced by torsion of this minute structure may be out of all proportion to the size of the appendix testis the condition may easily be mistaken for other intra scrotal diseases, such as acute epididymitis acute orchitis or torsion of the spermatic cord. In other instances a diagnostic mistake may be made because the initial symptoms sometimes focus attention upon the lower abdomen with little to indicate that the lesion is inside of the scrotum. This occurred in the first case described in this article in which the non scrotal symptoms and signs confused the diagnosis to the extent that the condition was first called acute

Diagnosis of torsion of the appendix testis may be very difficult. In general the symptomatology is that of torsion of the testis. Both conditions occur chiefly in preadolescent or young adult makes in both attacks of incomplete transient torsion with

slight symptoms may have occurred previous to the acute severe episode. It has been said that torsion of the appendix tests does not result in inflammation of the scrotal skin, while torsion of the tests does produce this condition. However in both of the authors cases marked crythems and edema of the skin of the affected side occurred.

Except by palpation of the spermatic cord and the scrotal contents it will be impossible to distinguish between torsion of the testis and torsion of the appendix testis. If there is a tender mass anterior to the testis it may be either the epididymis of a rotated testis or a twisted appendix testis. Differentiation can be made only by careful examination

The epididymis of a rotated tests would extend down the entire length of the testis while an an terior mass due to torsion of the appendix testis would be limited to its upper pole and be movable

upon the testis.

Very little information could be obtained from articles on torsion of the appendix testis regarding the usual histological appearance of this small structure Furthermore textbooks on histology give descriptions that are not entirely in accord For example Bailey's Textbook of Histology states that the appendix testis (hydatid of Morgagni) is a vesicular structure lined by simple columnar epithelium surrounded by vascular con nective tissue. Maximow and Bloom say that the appendix testis is a small nodule consisting of vascular connective tissue and lined with columnar. sometimes ciliated epithelium. Lowsley and Kirwin state that the hydatid of Morgagni is a pedunculated pear-shaped sac from one-eighth to one-third inch long its free extremity dilated and containing a colorless fluid The lack of informa tion on the histological structure in case reports of torsion of the appendix testis and conflicting reports on the histological picture as described in text books prompted the study of 28 appendices testes from the standpoint of their gross and microscopic anatomy

Grossly the appendix testis is a small ovoid or flattened tab of pale gelatinous tissue varying from r mm. to r o cm. in diameter. It is attached to the tunks albugines by a short pedicle. In at least half of the specimens examined, the pedicle was sufficiently long and narrow so that it could have under gone torsion.

Microscopically the appendix testis was made up of loosely arranged connective tissue which was moderately rich in blood vessels. In the connective tissue of some specimens were seen spaces of varying size apparently lined with endothelium and frequently containing a precipitated albuminous material. These structures had more the appearance of lymph channels than that of remnants of epithelial lined tubules. Most of the specimens had a few scattered leucocytes in the tissues. All of the appendices testes were covered by tall columns epithelium which was sometimes ciliated and associated with the columnar epithelium were a few

round pale mucous secreting cells. This epithelium became continuous with the very flat columnar epithelium of the tunica albugines.

Epithelial inclusions were present in 2 of the 35 specimens. The spithelial covering of the appendix testis and the lining of the epithelial inclusions closely resembled the lining of the distal end of the fallopian tube of the female. This would be expected because the appendix testis is derived from the cranial end of the mucllerian duct which in the female forms the fambinated end of the fallopian tube.

#### Francia, R. S.: The Status of Hormonal Biomanny in Malignant Discase of the Testicle. *Brit. J. Surg* 1945, 33, 173.

With the exception of the aeminoma, which is considered to be derived from the spermatic tubule cells testicular tumors have come to be denoted by the name teratoma." and other names depending upon the type of tissue which predominates have been spilled to this group, such as choricepi thelioma, embryonal adenocardooma teratoid carcinoma with cancerous elements and "mixed adult types with carcinoma."

In 1950 Zondek discovered that malignant tumors of the testis caused the unite to give a positive Ascheim-Zondek pregnancy test. In the test and mal a ovary three results were obtained (1) rigen ing of the graafian follicle (2) hemorrhage into the cyst and (3) gross enlargement of the uterine homs It is now understood that the homone output tends to vary indirectly with the degree of cellular mater ity of the tumor However one cannot forceful the histological type of tumor from blossasy of the tumor alone. There is a correlation between the homone levels and the clinical course and consistent high levels usually lead to a fatal outcome It must be pointed out that many negative assays have been associated with malignancy.

The test is a valuable indication of the effective ness of treatment. When the hormone output fails to 400 mouse units per litter within two weeks of the completion of treatment, the prognosis is good. A rising or stationary titer after treatment is a bad omen it is due to local recurrence or metastasis.

The test has various limitations such as varia tions of methods of extracting urine the numbers of mice used per level of assay variations in the inter pretation of overy changes, and the original masses of timese present which give rise to increased hor mone output. In the present stage of the test, the assay of the urinary hormones is not a basis for attempting to foretell the histological type of tumor There is some evidence that the seminomas produce only follicle stimulating hormone and that embryonal teratomas produce both follicle and lutein stimulating bermone (cherionic hormone) Simple orchectomy is the operation of choice, followed routinely by irraduation, especially of the aortic glands, whether or not metastases are suspected This routine would cause fibrosis of the lymphdrainage system and prevent the spread of a possible local recurrence subsequent to treatment.

There is need for a standardized technique of extracting bormones taking 44 hour specimen, making routine analys before treatment and senish during and after treatment uning more than I mouse per level of concentration, making histological section of the mouse every after the test, and which glossasy of the tumor with determination of the two hormones separately. While the range ditter is characteristic for the three main groups—the embryonal terations at the seminous, and the mixed adult terations—the precise pathology of a particular tumor cannot be predicted from the preoperative univary seasy, although low levels suggest either seminoma or the mixed adult type. Follow up tests should be performed for at least to years after treatment—first weekly then at less frequent intervals, and then at six month periods.

DAVID ROSENSLOOM, M.D.

## MISCRILANEOUS

# Burhans, R. A.; Treatment of Orchitis of Mumps. J. Ursl., Balt., 1945 54 547

The so-called entity "orthitis of mumps" is a missioner I has been considered an infection or inflammation involving the testes. In a navil hospital it was observed that the patients do not develop prinarily an orthitis of mumps but an acute hydrocele around the testicle which causes a strangiation of the testicle, in contradistinction to a slow forming hydrocele. This acute process causes strangulation acute inflammatory elema, and ultimate fibrosis and atrophy of the testes. These facts have been substantiated at operation

During the scute scrotal involvement of numps there is a high fever and lencocytosis, but after from 12 to 34 hours the damage has been done even though the temperature subsides.

If a small scrotal incition is made during the scrot orbibits an acute hydrocels is encountered in which the fluid in the tunion vaginalis is under extreme pressure and has a viscid yellowish color. After drainage no other treatment is necessary and the fever simulates a crisis of pneumonia. If drainage in delayed, the tension in the hydrocels essens, the testicle becomes blackish and the testicular tissue presents bulbous edema and infammation.

In early cases of orchitis of momps incision of the acute hydrocele with removal of the drain in 48 hours is indicated and in late cases, the trained proprise and albeginia should also be drained Frentothal soddium anesthesia has proved most attriactory but local anesthesia has not, as the in volved area is tender DAVP ROTERINGON MLD.

Cook, E. N., and Kearing, F. R. Jr r Renal Calculi Associated with Hyperparathyroldism. J. Ursl.,

Balt., 945 54 5 5
Since only 4 cases of proved hyperparathyroldism were observed at the Mayo Clinic from 1929 to 1943 and since this incidence was at a variance with the experience of Albright and his associates who accumulated 67 cases in 10 years the authors made a deliberate search for the disease in the material of the Mayo Clinic from January 1943 to July 1944. They discovered 18 cases I nt of these the patients had only the classical disease of the bone which is observed in hyperparathyroidism while in 14, associated renal calculi were demonstrated and evidence of disease of the bone was minimal or absent

During this same period S50 cases of unnary calculus were seen. Although this would indicate an incidence of 2 per cent of hyperparathyroidsm in cases of urinary calculus, the authors believe that this figure is far too low since only a relatively small proportion of these patients were subjected to a sufficiently careful metabolic study to exclude hyper parathyroidsm completely

A hyperfunctioning parathyroid adenoma was demonstrated in all of the 18 cases of hyperpara

thyroidism.

The frequency with which the diagnosis is made correctly will vary directly in proportion to the thoroughness with which a search is made for the disease. The greatest opportunity for establishing such a diagnosis will appear in cases of multiple or recurrent calculi. Approximately 10 per cent of urinary calculi will recur following surgical removal. The authors believe that this percentage can be reduced appreciably if the presence of hyperpara thyroidism is carefully excluded

The diagnostic criteria of hyperparathyroidsm are hypercalcemia, hypophosphatemia, hypercal cinuma and hyperphosphaturia. Frequently repeated examinations are often necessary to establish a diagnosis. Roentgenological findings may be helpful in cases with associated disease of the bone in cases in which there is uncertainty the authors frequently rely upon quantitative determinations of the calcium in the urine while the patient is on a det low in calcium.

When calcull are present the symptoms are identical with those occurring with calcul- due to other causes. In all such cases a detailed unological study is indicated. It is usually advisable to remedy the hyperparathyroidism first, as subsequent calcull may develop rapidly. It may however be necessary to take care of the urological problem first because of its acute character

Many forms of medical therapy have been tried. Diets low in calcium are unlikely to allevize the renal symptoms and subject the skeleton to the hazard of demineralization. Diets high in calcium increase the tendency toward stone formation Acidlying drugs such as ammonium chloride are of little avail because the increased solubility of calcium in an acid utune is counteracted by a resulting increased output of calcium in the urine.

The treatment of byperparathyroidism is surgical, by removal of the offending parathyroid adenoma, or when primary hypertrophy of all parathyroid issue is involved, by subtotal resection of the parathyroid glands. The unnary calculi already present usually remain unchanged, but in a few instances they have eventually dissolved.

FREDERICK LIEBERTHAL, M.D.

Hellendall, H.: Experimental Transmission of Lymphogranuloma Venereum Virus through the Placenta. Am J Surg. 1945, 70, 320.

Since it is known that the virus of lymphogram lona venereum can invade the blood stream, the author attempted to determine if lymphogramuloms venereum can be transmitted through the placents to the fetus. In 1936 a positive free reaction in a 14 day old infant was observed by Dick. The author's studies in 1942 showed that the antigen prepared from the fetal brains of mice gave positive intradermal reactions.

The present work was concerned with three questions (1) Can the previous work with mice be confirmed with Frel tests in human beings? (2) Can the initial elementary bodies of the lymphogranuloma virus be found in smears and tissues of the fetal brain? and (3) Will antigens from the brain of an intracerberially infected mouse give a positive Frel test when injected into the skin of an apparently healthy offspring of an infected mother?

The conclusion was reached that lymphogranu loma virus is transmitted through the placents to the nowborn before delivery. The clinical question as to whether there is any occurrence of congenital lymphogranulomatosis in human beings should be studied with a great amount of statistical material

DAVID ROSENBLOOM, M.D.

# SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

## CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Mayerding, H W 1 Chronic Scierosing Osteitis. West. J Surg. 1945 53: 413.

The patients included in this series of 80 cases of chronic selectaing outcils were of the average age of 15 years, appeared to be in good health, and were not disabled. The preoperative clinical laboratory findings of the blood and urine were of little value in the diagnosis. Trauma may have been an inciting factor of the condition in 31 2 per cent of the cases.

The outstanding symptom was persistent localized part in 19,3 by error of the cases 16 75 per cent this was associated with swelling. The duration of the symptoms averaged 1.4 years. Sixty five per cent of the patients were males. In 0.75 per cent of the cases the lesions were located in the lower extremity, 50 per cent occurred in the middle third of the shaft of a long bone 50 per cent occurred in the that of the tible or fermer. Fathent aged from 10 to 30 years comprised 60 per cent of the total number

The roent genograms revealed dense spindle shaped cortical regions of sciencist that involved the shaft of the long bones. Translucent regions, small and round, or oval, were often visible. These regions cometimes showed staphylococt on bacterological examination of the material removed at operation and have been looked on as foci of infection producing the aderests.

The treatment is surgical excision and the results obtained are good.

ootamed are good.

Compers, E. L., Schnuts, W. J., and Cattell, L. M.: The Use of Penicillia in the Treatment | Acute Hematogenous Ostromyelitis in Children. A. s. Swg 945 ! 954.

This is a report of 12 consecutive cases of acute hematogenous outcompelltis in children ranging from 3 to 12 years of age which were treated with

penicillin.

Ten of the cases had been resistant to sulfons mides and only 4 required surgery. There were no deaths.

The authors state that penicillin appears to be more effective in the treatment of scute hematog enous esteomyelitis than any other therapeutic

agent including the sulfonamides.

Adequate dotes of penkelllin, from 15,000 to 50,000 units administered every 3 bours day and night, may not only cure the initial infection but prevent spread to other bones and in most of the cases they make surgery unnecessary. If the treatment is started late bone damage may call for late surgery

started late bone damage may call for late surgery
Medical care must not be neglected in these cases.
The fluid balance of the body must be maintained
with normal saline solution, glucose blood or plas-

ma. Splints, plaster casts or traction are used when indicated DASIEL H. LEVISTHAL, M.D.

Marôttoli, O R.: Osteoarticular Lesions in Bru cellosis (Lesiones esteoarticulares de la brucelosis) Rev méd. Reverie 1945 35 8 1

Ostenaticular lesions observed in the course of evolution of bracellovia are characterised as h the disease itself by clinical manifestations of various forms. There are many transitional form between monearticular and generalized polyarticular lesions. From the physiopathological werepoint the syndrome may be divided into two classes. (1) altergia manifestations of the early periods of the disease chiefly in the form of hyperergic reactions of measurabymal osteocarticular itsues and (3) processes confined to one articulation or one osteoperiostal segment, which are the sequelae of the accumulation of specific bacilli. Only the last mentioned group represents the authentic lesions of bracellosis.

Two groups of esteoarticular lesions may be dis-

tingulahed osseous and articular

Opscous lesions in brucellosis are relatively rare and occur approximately in 1.8 per cent of all pa tients if the spinal column is excluded. From the anatomoclinical point of view two conditions may be distinguished, esteoperiostitis and esteomyelith The first mentioned condition may assume a simple form of reaction or may develop into a suppurative lesion. A simple reaction is characterized by pains and roentgenological findings, while suppurative conditions have a chronic evolution. Osteomychts may appear in an acute or chronic form. Osseous lesions produced by brucellosis are relatively benign and show a rapid tendency toward regression and reparative processes. Various types of chronic osteomyelitis such as pseudotumoral condensating, or inflammatory have been described. The diagnosis may be difficult if the involvement of the bones appears in very early stages of the disease.

Articular lesions appear in approximately 40 per cent of all cases of brucellosis. They may assume two forms pseudorheumatism and arthropathies. The first mentioned condition appears nearly exclusively in the acute periods of the disease and may be inter preted as an allergic reaction of the articular mesenchyma to the infection and the toxic effects of bru cellosis. The condition may be monoarticular or polyarticular Arthropathies may be classified as synovitis arthritis and osteoarthritis. Brucellosis shows a preference for primary localization in the osseous epiphyses, invading the articulations sec onderly As a rule large articulations are affected. Generally articular lesions of brucellosis are relative ly benign and no important anatomic or fuctional acquelae are recorded. Occasionally an ankylosis may develop Involvement of the spine has been found in as many as from 50 to 75 per cent of all

autorsies of patients suffering from brucellosts. As a rule spondylitis appears in relatively late stages of brucellosis. Various distinct processes develop within the spinal column viz. degenerative de structive and reparative. The process may involve intervertebral discs. Three forms may be disting guinhed (1) generalized or circumserfbed spondyl lits, (2) a condition resembling Pott's disease and (3) a spondylearthritic form. The symptoms are those of an involvement of the spine due to any cause namely pain muscular contractures deform itles, and the formation of abscesses. There are no characteristic roentgenological signs. Frequently osteophytic and exostotic formations are visible. The process is relatively beause.

The treatment should be directed toward the etiology Spondyltis requires immobilization on Bradford's frame or in a plaster-of Paris cast. Al bees operation may be considered if spondylitis is circumscribed and if an intervertebral disc is in volved Social economic and personal problems should be taken into consideration when a pro-

longed immobilization is contemplated

Joseph K. Narat M D

Soule, A. B., Jr Mutational Dysostosis (Cleidocranial Dysostosis) J Bone Surg 1046 18 8t

Mutational dysostoris frequently transmitted by parents to offspring is characterized by multiple variable skeletal anomalies. The most prominent and frequent of these are aplasis of the clavicles irregularities of dentition and structural shoormal ities of the jawn skull vertherae pelvis, femora exapulae metacaraplas metacarable and phalanges.

A careful survey of the English literature establishes that the first authentic case was reported in 1870 and since then the author's collected cases total 323 of which 198 are familial, involving 52 families. About half of the patients are males Geographic distribution represents every continent. In the cases with a hereditary background there has been transmission by male and female to a nearly equal degree. The condition may appear in several successive generations and then be lost and apparently not reappear in subsequent generations.

The etiology is associated with a defect in the parental germ plasm so that the anlage of the affected bones, both membranous and of chondral origin is thought to be faulty. Various other theories and observations are presented, none is conclusive. Meat of the skeletal defects found in mutational dysostosis are present at birth but may not be obvious until the child develops. The possible variants are so great that no one abnormality is characteristically found in all cases.

A comprehensive discussion of the abnormalities possible in this condition is given and illustrated with photographs and roentgenograms. The dental defects with their complications are most trouble some, and treatment in general is directed toward the alleviation of symptoms. Six cases, two pairs of which were related are presented fully and demon

strate the variability of the defects. The multiplicity of defects which may occur in this condition makes it rational that the term—deidocranial dysostosis be replaced by the more accurate and descriptive term—mutational dysostosis.

FRANCES E. BRENNECKE, M.D.

Smith F M : Late Rupture of the Extensor Pollicia Longus Tendon following Colles Fracture J Bone Surg., 1946 18 49

Late rupture of the extensor polilicis longus tendon following Colles fracture is an unusual complication which results in disability that may be relieved only by operation on the tendon. The author has observed and treated 5 cases of this type on the Fracture Service of the Presbyterian Hospital, New York. These cases are described in detail with illustrations.

The complication has been previously described in the literature and the incidence was given as 1 to 270 Colles fractures At the Presbyterian Hospital New York, the incidence was 1 to 368 The majority of the ruptures have occurred in the left wrist and 4 of the 5 cases reported were in the left wrist and 4 of the 5 cases reported were in the left wrist. The complication is more frequent in females (60 per cent) and all 5 of the reported cases were in females The tendon rupture is more common after the age of 30 years and the age incidence in this series was from 21 to 6x years of are

The cause of the rupture has not been definitely established but it probably follows rather late after acute or chronically repeated trauma Factors such as partial laceration of the tendon by a spicule of bone and trauma from forceful reduction of the fracture have been considered. Numerous cases of rupture have been reported when the fracture was minimally displaced or unrecognized and no reduction had been done. In a of the 5 cases reported the nationts sought treatment late that is 10 days and 2 months respectively after their falls. Neither nationt suspected she had a fracture and since in neither case had the fracture been reduced or the wrist splinted it was impossible to consider rough manipulation or faulty splints as a predisposing cause of the tendon rupture. In the a other cases the latent period of tendon rupture was 25 days, 27 days and 6 weeks. From the operative and pathological findings in the 5 cases it is the author's belief that in rupture following Colles fracture the cause is an aseptic necrosus due to interference with the blood supply of the tendon at the distal end of its groove on the radius.

There are no symptoms prior to rupture which would lead the surgeon to suspect a degenerative process in the tendon. A few patients describe a single sharp pain when the tendon ruptures but most of them describe what they call a sensation of something giving way or a snap on the back of the wrist followed by inability on their part to atraighten or to lift the thumb actively. They may also note difficulty in picking up small objects such as pins. No subjective sensory changes are noted

Physical examination reveals first, a thomb that droops in its entirety, and second, partial feeding of the distal phalans. There is inability to elevate the thumb actively to the same level as the other meta carpals, and it is impossible for the patient to extend the distal phalans actively against resistance all though this can be done passively. The ultims border of the anatomical smulbox is characteristically absent. Occasionally the swollen degenerated end of the distal portion of the ruptured tendon can be felt beneath the skin and subcuttaneous tisne as a small bump. There is no loss of skin sensation over the superficial distribution of the radial nerve.

The site of rupture in the extensor pollucis longus tendon is usually at the level of Lister's tubercle on the donum of the lower extremity of the radius. The datal portion of the ruptured tendon is usually drawn downward and the proximal portion usually retracts upward to the upper edge of the donal radiocarpal ligament or even more proximal to this. As much as 5 cm sometimes separates the two tendons and the radius through which the tendon passes becomes obliterated. A specimen stalled with Schariatch R showed the presence of lat between

the tendon fibers

In considering the operative repair of this condition, the author emphasizes that the extensor pollicis longus tendon has a dual function. Extension of the distal phalanx upon the proximal phalanx at the interphalangeal joint is probably the less important half of this tendon's function. Drooping of the thumb as a whole which is observed in this complication, is due entirely to the loss of the oblique pull of the tendon. Any operative procedure designed to restore full function must therefore restore the oblique pull. Following experiences of the first 3 cases the author recommends auture of the distal end of the extensor pollicis longus to the extensor carpi radialis longus by end-to-side suture following this, the tendon of the extensor pollicis brevis is also drawn over and sutured by a side-to-side suture. The first hookup gives the lift to the thumb and the ex-tensor pollicis brevis adds extension to the distal phalanz. The ideal method of repair by resuturing the tendon ends or by implantation of a free tendon graft is prevented by the adhesions that are present even if they were broken it would result only in bleeding that would produce more and denser ad hesions. During postoperative immobilization the tendon would "freeze" and become nonfunctioning. Upon exploration and repair of the tendon the super ficial branch of the radial nerve should be isolated and protected because damage to it may lead to distressing numbress of the dorsum of the thumb

Following operative cleaver the hand, the wrist and forearm should be immobilized in a volar modeled plaster rollar in slight cock-up position with the thumb fully extended and elevated. The splint may be removed at the end of 10 days and the patient encouraged to begin moving the thumb very gutly in figure and extension. He should then be advised to remove the splint 3 or 4 times daily for exercises and for hot socks. Usually at the end of 3 or 4 weeks it is possible to discard the splint completely at which time the exercises are increased and the patient is encouraged to begin mild active use of the thumb

In all of the 5 reported cases the patients aboved improvement in function and use. The best follow up results from a functional standpoint were found in the cases treated by the operation proposed by the author. Warners, M.D.

Guri, J. P.: Progenic Ostsomyelitis of the Spins. Differential Diagnosts through Clinical and Roentgenographic Observations. J. Bens Sur. 1946, 33. 89.

This article is based on 48 cases of pyogenic orteomyelitis of the spine. In order to arrive at the cor rect diagnosis it was necessary to be very careful in the differential diagnoses. Some of the conditions considered in these diagnoses were scute appendicites, the meningeal syndrome, and the back pain syndrome. The latter was divided into an acute form (16 cases) the subscute form (7 cases) and the insidious form (19 cases) Here the diagnosis rested between the differentiation of pyogenic infection from tuberculosis. The site of the pyogenic infec tions varied they involved the spinous articular process the transverse process, or the laminae. When pyogenic osteomyelitis involves the vertebral body it may be divided into the localized or diffuse form When the diagnosis is tuberculous, in adults, areas of increased density are not frequently found in the roentgenograms of living subjects except when there have been secondary infections hage sequestra, or sudden collapse. There is a definite increase of density and scierous in pyogenic spondylitis thus these features are diagnostic and permit the differentiation between tuberculosis and progenic spondylltis. REMARD J BESSETT Ja., M.D.

Hatcher C. H.: The Pathogenesis of Localized Fibrous Larices in the Metaphyses of Long Bones. Ann. Surg 1945, 12 1016.

Because of the various secondary characteristics which are prominent in the course of localized benign fibrous lesions of bone, a variety of lesions have been described under various diagnoses. Philip and But man and Sinberg described the lexions as solitary xanthomas, while Geschickter and Copeland called them variants of solitary bone cysts or benish glant cell tumors. Phemister described some localized non suppurative lesions of bone as fibrous osteomyelltis. Some of these would now be included in the lesions described as esteoid esteoms. In 1012 Jaffe and Lichtenstein demonstrated the various stages in the development of solitary fibrous lesions of bone and interpreted them as benign tumors formed from mature marrow connective tissue. These were called nonceteogenic fibromes of bone

The anthor reports on 51 lesions found in 45 pt tients and demonstrates the clinical, roentgenolog

ical, and pathological findings in the various stages of the development and regression of the lesion. There were 38 males and 17 females. Five patients had multiple lesions. The lesions had their inception during the period of longitudinal growth. All of the lesions were in the long bones of the lower extremities. Jaffe and Lichtenstein found 1 lesion in the distalend of the ulna. All of the lesions were situated in the metaphysis or adjacent shaft usually eccentric and abuttung on the cortex.

The symptoms are usually mild and consist of intermittent moderate pain often referred to the

adjacent joint, and local tenderness

Reentgenographically there is a limited area of reduced density in the metaphysis close to the epiphyseal disc which in later cases clongates and has a scierotic margin, usually scalloped which gives the abonerance of loculation Later cases may

show periosteal reaction

The pathological appearance varies somewhat with the age and activity of the lesion. Fibrous con nective tissue is the basis of the lesion in all stages The recently formed focus shows a relatively cellular fibrous tissue with scattered multinucleated cells. The older lesions show fibrous tissue arranged in strands and whorls. Lymphoblasts are found scat tered through the fibrous tusue. Lipoid filled macrophages are often present grouped or scattered The lipoid deposition is evidence of chronicity Concomitant epiphyseal disorders were observed in 14 cases Spontaneous healing of the abrous metaphyseal lesions was usual. In only a few cases was surgical eradication necessary for the relief of pain The etiology of metaphyseal fibrous defects is obscure DANGEL H. LEVETHAL, M D.

# SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Robertson, I. M. and Barron J. N.: A Method of Treatment of Chronic Infective Ostellia. J. Bons Surg., 1946, 28-19

The authors treatment of chronic infective extel its in based on the principle of extensive excision of all diseased tissues including skin, deep scars and infected bome and the replacement of soft tissue defects by mucle and skin flars and of bone defects

by bone transplants.

This procedure may require two or three operative stages. In the first stage all of the diseased tissue is excised and a split skin graft is applied to the wound surface. In the second stage there is a plastic repair of the soft tissues. The original split skin graft is removed and the area is covered by a skin and subcutaneous flap muscle being included where necessary. Stage three consists of repair of the bone graft. In some cases the second and third stages may be combined. An interval of 4 weeks is suggested be tween the first and second stages and one of at least weeks between the second and third stages. In some cases the full diameter of the shaft of the bone may be involved.

Several diagrams photographs, and roentgenographs are included in the original article. The details of the operative care in the three stages are discussed at length. A word of warning is given that this is not an undertaking to be lightly embarked upon by the operator.

RICHARD J BENNETT JR., M.D.

Starr D E.: Congenital Absence of the Radius. J Bens Surg 1043 27 572

Three cases (involving four limbs) of congenital absence of the radius in its various aspects have been seen by the author

The most interesting was a bilateral case with congenital absence of the radius the thumb and the first metacarpal bones. The a other patients showed partial or complete absence of the radius and absence of some of the carpal bones. This deformity is disabling and very unsufuly

A three stage procedure is carried out whereby skeletal traction is applied uliar osteolomy is per formed and a fibular transplantation is carried out. The end result is particularly good in that it allows forearm rotation and wrist motion when part of the radius is present, and presents an extremely improved appearance.

RICHARD J BENNETT JR., M.D.

Aithen D M: Late Results of Albee Fixation of Tuberculosis of the Spine. Proc R. Soc M., Lond 1945 38 685

The author states that during the past 40 years the treatment of tuberculosis of the spine has passed through two phases and entered the third. The first phase consisted of fixation of the affected joints on a controlling splint until all pain and swelling had disappeared and the patient's condition was thriving. The second phase may be saud to have begun about 1911 and was first applied in Robert Jones practice, mainly for tuberculous disease of the spine. It consisted in the addition of a bone graft with the object of securing extra-articular fixation and bridging the diseased area to secure more comlete fixation.

The third or present phase is based on the extra ordinary results which followed successful employment of the Robertson Lavalle technique which is briefly outlined. This procedure consists of drilling ruberculous foci which are believed to contain some defensive substance which cannot escape into the general circulation on account of the constriction of the issuing capillaries by the tough capsule about the focus. Drilling into the focus supposed to let this mysterious substance out into the systemic circulation. Only young foci are drilled. These show on the x ray as faint blurred areas of decreased density.

Use of the procedure is said to be followed by marked improvement in the well-being of the patient. Pain usually disappears quickly and the degree of sepsis is lessened

VERNOR C. TURNER, M D

Dulocation of the knee point is frequently associated with peroneal nerve injury and rupture of the poplical artery. The latter complication occurred in 10 legs which had to be amputated because of subsequent gaugeres.

Thirty two patients were unconscious for periods varying from a momentary lapse to several days. They were thrown in a vertical direction up to 115

feet and horizontally up to 200 feet.

The first aid treatment of solid blast injuries is primarily devoted to saving life i.e. the treatment of shock, splinting of the injured parts and evacuation to safer places for definitive medical care

The final management of these patients follows along well known lines. It is noteworthy that skele tal fixation devices (Roger Andersen Stader) were found to delay unno and cause osteomyelitis around the pin holes. Sailors who were in their bunks at the

time of the explosion suffered the least injuries.
In conclusion 13 case histories are described in detail.

Groupe I. Raus. M.D.

#### ORTHOPEDICS IN GENERAL

Bateman J E.: A Universal Splint for Deformities of the Hand. J Bone Surg 1036 28 160.

A splint is presented for the maintenance of adequate immobilization of the wrist and fingers deformed as a result of nerve injury. This apparatus prevents overstretching eliminates undue pressure on devitained tissues and avoids stiffness due to produced immobilization. Stiffness is avoided by re



Fig 1 The splint is applied in a paralysis of the median nerve, requiring finger and thumb correction. Note that the thumb may be pulled from the position of adduction.

moving the device twice dally, and actively and passively moving the immobilized parts. This process is made very simple by the construction of the universal splint.

The splint consists of a universal holder to which accessories consisting of steel arches (orag by o oginch) twisted in a coll are attached. The spring arches are held on the holder by stude on fixed swivels.

The splint can be used as a posterior splint, as an anterior splint, and as a combination splint.

George L Reiss, M.D.

# SURGERY OF THE BLOOD AND LYMPH SYSTEMS

#### HIJOOD VESSELS

Gross, R. E.: Surgical Correction for Conretation of the Aorta. Surgery 1945, 18 671.

Researches on dogs were carried out which indicated that the aorta could be completely transected and a normal vascular pathway reconstructed.

Two case reports are included in which the constricted area of the aorts was reserced. In the first case the patient died of cardiac dilatation said to be due to the fact that the blood was allowed to re-enter the great vascular bed in the lower part of the body too rapidly. In the second case a 12 year old girl was studied and prepared for poperation. The operation was carried out successfully in June 1945. The constricted area was resected and a satisfactory end-to-end anastomoris was completed. The patient made an invertiful recovery.

It was interesting to note that the blood pressure in the lower extremities came up to the normal level over a period of several days, while the hypertension in the upper extremities gradually decreased over number of days. Researd | Basvert Jr. MV B

Paul, M : The Surgical Treatment of Traumatic Ansuryama. Brit. J Surg. 945 33 : 3.

The surgical treatment of large ancuryums is attended with difficulty and danger and the successful management of such cases domands a high degree of technical skill together with a proper appreciation of the problems of this branch of surgery. The author presents detailed reports of 8 cases. These indicate how problems have been met in individual instances that are not so common as to be within the experience of most surgeons.

A brief history of the surgical treatment of aneu-rysms is presented. The risk of gangrene of a limb following an operation in which the blood flow through the main artery has been obstructed by the operative procedure should be minimised as far as possible. If the arteries distal to the aneurysm exhibit a normal pulsation it is clear that most of the blood is still traveling through the main artery. In the traumatic cases the ancurvam is likely to be saccular and suitable for treatment by the restorative endoaneurysmorrhaphy method of Matas which carries almost no risk of interference with the main circulation through the limb If on the other hand there is no pulse in the arteries distal to the aneuryam, it is clear that the circulation is being carried on mainly by collateral vessels and Matas advocates that the deficiency of the collateral circulation be estimated by the following method

The lumb is blanched by elevating it and by the application of a firm elastic bandage. The main artery is now compressed above the ancuryan the elastic bandage is removed and the limb lowered. If the collateral circulation is efficient, there should

be a blush in the blanched limb within 3 minutes. If the collateral circulation is deficient, it can be improved by removing the sympathetic vasomotor control to the limb either by the operation of sympathectomy or more temporarily by the injection of the sympathetic field with novocasis.

In conclusion the author notes that among the 8 cases of aneuryams described, the aneuryam variation to the aneuryam variation to the aneuryam exhibited almost normal pulsation. In these cases the Matsa operation for reconstructive endoaneuryamorrhaphy proved thoroughly practicable, the patient being cure dy the operation.

In a cases the ancupyon was traumatic and fund from. The strete distal to the ancupyon showed nor pulsation. Maias obliterative codosneury-morthaphy served, however to cure these patients of their ancupyons. In I case which unfortunately proved fatal, the ancupyon was due to the rupture of an arterioscierotic calcified vessel. In this case the ancupyon had caused gangeren of the foot, which necessitated a disarticulation through the hip joint.

Hauser F Townson, M.D.

Buxton, R. W. and Coller F. A.; Surgical Treat ment of Long Standing Deep Philebitis of the Leg. A Supplementary Report. Surgery 1945, 18 661.

In the group of cases studied the long standing deep philobilits of one or both lower extremities had its onset from a months to 30 years previously. Ligation of the femoral wein was carried out in individuals who had pain or disability resulting from chronic deep thrombophichilis. The authors say get that hystin of the femoral wein abouth not be carried out beyond the age of 55 years because of the advanced atterfal diseases. Superficial varies were treated by ligation before the iemoral wein hysticas was carried out. The injection method of treatment of varieous evens was not used before, during, or after femoral ligation and none of the patients had received lumber sympathetic block before during or after femoral year ligation.

Of the 14 patients with alceration, 6 have had complete bealing of the ulcers for z year or longer Others were healed for a shorter period of time. In a patients the areas are still unbauled. Reports in dicate that there has been little improvement in the degree of swelling as compared with the prooperative status. Fatigue without exception continues to be a permanent symptom. When involvement way sent at hove the level of the profunds femority, rein ligation of the common femoral vein was carried out it is believed that the level of vein ligation above or below the profunds femoris, profunds femoris profunds femoris patients when the profunds femoris in the vein the profunds femoris branch bears little reis ton to the degree or duration of postoperative edema, to the appearance of superrical variest postoperatively or to the end result.

The common iliac vein was ligated in r patient. Postoperative lumbar procaine injection produced

little change in the patient s leg

The inferior vena cava was ligated in 7 patients with a longstanding philebits of both lower extremities. The first patient upon whom a ligation of the vena cava was performed has now passed the twelve month period following it, and has no edema, although a prolonged trial without external supports as not been made. All the other patients in this group are still wearing supports. The outstanding end result in ligation of this type is the high includence of healing of ulcers due to stasis. The most disappointing results have occurred in patients upon whom ligation was carried out when such ulceration was not present. The treatment has not been very satisfactory in this group.

RICHARD I BENNETT JR. M.D.

# BLOOD; TRANSFUSION

Corelli, F: The Rh Factor the Cause of Fetal Erythroblastosis Hemolytic Disease of the Newborn and of Transfusion Reactions (II fat tore Rh causa dell critroblastosi fetale, malattia emolitica del neonato e di reazioni da trasfusione) Palidinico (res. prat) 1945 52 359

This article is almost entirely a review of the American and English literature on the Rh factor which has already been ably reviewed Its purpose is to acquaint such part of the Italian med cal profession as is not already well acquainted with the subject—with the possibilities in the duagnosis and treatment of anemias edemas purpuras, and ictene conditions of pregnancy and infracy and with the explanation of many instances of abortion or premature delivery Of course, many Italian doctors have been working in this field, for instance, Pontano has been transfusing with blood which is negative to the N factor.

The author himself finds an explanation of some of the mishaps in the past. For instance r of his recently observed patients who 3 years previously had received a number of transfusions without incident received another harmless transfusion incident to the development of a marked hypoplastic anemia. Thirteen days later she received another homogroup transfusion, which was suc ceeded an hour later by a typical severe reaction. Of course the mishap might be ascribed to the inadequacy of the crossmatching tests and even of the so-called biological test (an initial injection of 20 c.c. of the donors blood with observation for 5 minutes thereafter) However, the author thinks that the patient had received blood in one of the previous transfusions which was positive for the Rh factor then in the first of the current two transfusions the blood was Rh negative and in the second it was Rh positive and this brought on the reaction. However the patient fortunately recovered.

Considerable space is given to the correspondence section of the Journal of the American Medical As

sociation (1945 127 1146) in which Darrow claims that Rh positive blood should not be harmful to the erythroblastic infant. She postulates the correct methods of treatment for the condition, reserving perhaps for further study the question of transitusion with Rh positive blood and her opinions are accepted without reserve. The author also with apparent benefit has alkallinized the urine with bloarbonate of soda (a gm. every 4 hours) and ad ministered sodium lactate (Fox JAm.M.Ass 1944 124 127) for burn patients.

The author is now trying to build up a roster of Rh negative donors at the Uniti Hospital in Rome and intends to study further not only the question of the Rh factor but also the possibility of explain ing the surprise reactions among the homogroups themselves in which the Rh factor does not always seem to be culpable. These reactions occur even in the O group and are possibly due to other as yet little noticed factors such as the factors M N and He believes that other matters also should be included in these investigations such as the influence of the Rh factor in the unexplained occur rence of mental debility in children, as a high percent age of Rh positive infants delivered from Rh negative mothers has been found to be mentally deficient.

All of the aspects of this problem have been in cluded under a broader conception which the author has designated as "Hemopathic Allergy His book on this subject was published in 1944 by the publish ing house of Pozzi in Rome.

JOHN W BRESHAM M.D.

## LYMPH GLANDS AND LYMPHATIC VESSELS

Moreton, R. D: Lymphosarcoma with Primary Manifestations in the Gastrointestinal Tract. Report of 7 Cases Studied Roentgenologically Tests State J H 1946 41 458.

Lymphosarcoma is defined by Ewing as a true malignant neoplasm arising in lymphatic tissue from prohieration of atypical lymphoid cells This occurs as (1) a localized or (2) a diffuse process. It is one of the larger groups of tumors referred to as malignant lymphoma or lymphoblastoms and should be classified under this general heading

Because of the relative ranty of this condition the author thought it was advantageous to present a brief review of the pathological and roentgenographic findings as well as to present; cases of jumphosarcoma which manifested themselves as gastrointestinal lesions and were studied roentgenographically.

Two types of this tumor are recognized the small cell lymphosarcoma or malignant lymphocytoma, and the large cell or reticulum cell lymphosarcoma. Some authorities believe the distinction between the two types is important from both therapeutic and prognestic standpoints. In the gastrointestinal tract the growth originates in the submucosa and invades in each direction involving on one hand the

mucosa, and on the other the muscularis of the bowel.

In summarizing the author notes that the term tumelactive lesion" should be a useful one in the reentgeological field just as in gross pathological diagnosis. This term is used as a general one and does not define a specific etiologic or histological process, and is therefore used before the more refined.

methods of diagnosis are employed

Madiologists among them at to believe that receiptopologists is aming them as he made to estabbish the presence of any tumefactive lesion in the gastrointestinal treat at least as early in the ama tomic development of the lesion as the latter is also to cause symptoms and be mailfested by clinical signs. A necolpatic lesion may be distinguished from a non-neoplastic lesion may be distinguished from a non-neoplastic lesion with about the same accuracy after the examination of the gross specimen. Surgical exploration has abstantiated these beliefs to the extent that such reentgenological caps billities are well recomined.

Due to the rarity of lymphosarcoms as compared to carcinoms as well as the similarity of lymphosarcoms in the gastrointestinal tract to that of carcinoma in the same location, there is the tendency to report all of these lesions as carcinomas rather than tumefactive lesions or malirant neonlasses at the

particular site noted.

In this condition the roentgenological findings are not sufficiently characteristic to allow a specific diagnosis of lymphosarcoma of the gastrointerinal tract and for the reasons which have been stated carcinoma is the diagnosis that is most frequently made.

In conclusion, the author states that 1 new case of lymphos aroons with prinary manifestates in the gatrontestinal tract have been presented. The series included 5 women and 2 men. The locuspers patient was 21 years of age the oldest, 74. No distinguishing features of lymphosarroms were found either in the history or on roentgenological grantation. The y leakons viewed roentgenologically had an appearance indistinguishable from that of exchanges.

All patients were subjected to an exploration, operation, the diagnosis being made from blopsies. Fire of them were subjected to postoperative roengen therapy as noted in the case reports. Fire of the 7 patients have died one, 10 days postoperatively of bronchopocumonia and the others, 75 months 2 months, 10 months, and 2 months, 15 months

Two patients with involvement of the atomach were last seen at the clinic 34 and 36 months after their first admission. They showed no evidence of recurrence One of these patients had been treated by resection and postoperative irradiation the other.

received irradiation alone.

HERNER F TRUSSTON, M D

# SURGICAL TECHNIQUE

# OPERATIVE SURGERY AND TECHNIQUE POSTOPERATIVE TREATMENT

Smith, B. Cornell C. and Nelli C. L. Principles inh, H. Cornell G. and Nell G. L. 1. Principles in Early Reconstructive Surgery of Severa Thermal Burns of the Hands Bell. J. Serf.,

Regulations directing the proper use of protective for resisting appared will reduce burn hazards in military operations. Characteristic warting burns hazards in the control of of the hand involve the tissue over the dorsum of the band and fingers and have a tendency to encircle the

Deformity and disability resulting from thermal burns of the hands may be reduced by early manage ment. The initial treatment is directed toward the prevention of infection and the restoration of func ion. However infection and exposed tendons and bons do not contraindicate early grafting Radical control of shorts granulation tissue and poorly extrame or surger granuation thank and property developed entitlellum prepares the recipient surface developed entitlellum prepares the recipient surface developed entitlellum prepares the recipient surface. tor a split thickness graft which is sutured in place

Postoperatively dressings and splints are removed under the tension of normal skin on the fifth day Rehabilitation exercises are resamed until maximum functional activity is ob-

Levenson S M and Lund, C. C. Dermatome Skin Der Confessor S M. and Lund, C. C. Dermatome Skin Der Confessor State of the Confessor State tained

Grafts for Burns in Pattents Prepared with Dry Dressings and with and without Penicillin

Up to the time of the work presented in this re op to the time of the work presented it the Boston Crist Hospital were similar to those reported by Hirsh suspines were summer to mose reported by sussessing of the cases and the cases of the case of the cases of the case of the tenues us. namely that in about one-mutual memory of the tenues than 75 per cent take and in many of the tenues the contenues to the contenues unere was less man 75 per cent take and in many of feet cases the failure was 100 per cent. It was there feet cases the failure was 100 per cent.

fore decided to try the use of penicilin given par Twenty-eight dermatome graits were done on 19 mailtens with granulating third-degree burns. One patients with granulating third-degree burns. enterally

patients with granulating third-degree pures. One-half of the patients received parenteral penicillatreatment before and after grafting and the other

In other respects the techniques used in the two an unter respects the techniques upon in the dry half received no penicillin groups were identical. Before and after graining my sterile pressure dressings were applied with adequate sterile pressure dressings were applied with a grant sterile pressure dressings. wente pressure dressings were appined with the extent

and site of the burns, and the extent of the grait All granulating areas were locally infected, but were similar in the two groups The hemolytic staphylococcus sureus, the proteus there were no cases of spreading infection

vale aemolytic staphylococcus aureus, ine pioceus were the medical and the pseudomonas aeruginosa were the Pendellin had no effect on the bacterial flora or predominant organisms.

the appearance of the wounds.

The results obtained in both of the groups were

Simple dry sterile pressure dressings, infrequently changed are recommended before and after skin excellent

It appears that the improvement in the results of the prices that the improvement in the state of the state sam granums or granumning minuscripe pours of this hospital that was coincident with the start of grafting this study was not due to penicillin since the results in the patients who did not receive penicillin were in the particular way on the in the patients who did receive it. It should be emphasized however that the results in the control cases were such that the takes in the penicilin treated series would have had takes in the permenting tractice series to show a sign to be essentially perfect in all cases to show a sign to be essentially perfect in all cases to show a sign to be essentially perfect in all cases to show a sign to be essentially perfect in all cases to show a sign to be essentially perfect in all cases to show a sign to be essentially perfect in all cases to show a sign to to be essentially perfect in all cases to show a significant improvement. There was no change in the cultures from or in the appearance of the granu lating wounds during the period of penicillin treat ment It should be stressed however that there were no cases of septicemia or cellulities, the infection

DANIEL H LEVENTRAL, M.D. being confined to local areas.

Schmidt, E. R. and Hibms, O. V. Mortality after Operation 11 est. J. Serie, 1945 53 427

The authors have reviewed all deaths (128) follow ing operations done at the Wisconsin General Hosing operations done at the Wiscomin General ros-pital Madison in the year 1942 Classification of pital Madison there cases on the basis of evaluation as to the risk of the given procedure shows that other factors such of the type and amount of surgery play a greater

Although the majority of deaths occurred in the fourth fifth and sixth decades it was believed that more operations are done in these age groups use more opened as a control in the very and that the mortality is actually highest in the very

A review of the deaths occurring from 1938 to A review of the occasion of the recommendations of young and the very old 1944) mesonicu according to the recommendations of the American Society of Anesthetists, shows a very direct correlation the mortality varying from 0.085 orrect correspond to the best physical state to 57 5 per cent for those in the best physical state to 57 5 per cent for those practically moribund before

Seven deaths in the operating room are reported oeven uesum in the operating from are reported with brief abstracts. The author points out that if with the susceptibility of the sufferings of one is more interested in relieving the sufferings of operation the patients than in the mortality rate the deaths are une patients than half of the 178 patients unavoidable. More than half of the 178 patients

died siter the unity postupersure usy
Three conditions secounted for 45 per cent of the
Three conditions secounted for 45 per cent of the
Three conditions second control nervous system

central parameters follows for control of the ded after the third postoperative day deaths succumums 1932/01 College (19 5%) Other failure (19 5%) and cardiac failure (19 5%)

The authors emphasize that evaluation as to risk in annous cultures on the experience and is important that tak varies with the experience and causes are listed.

in imposess. The same of the surgeon and the clinical judgment and acumen of the surgeon and anesthetist that routine orders are dangerous and

that close attention to particular systems without neglect of the patient's general condition is essential. TROMES C. DODGLAM, M.D.

# ANTISEPTIC BURGERY; TREATMENT OF WOUNDS AND INFECTIORS

Weinstein L. and Wesselhoeft, C.; Penicillin in the Treatment of Tetanus. \ England J M

Two cases of severe tetanus are reported in which recovery followed treatment with large amounts of antitoxio, surgical excision of the wounds and admin istration of large doses of penicillin

Bacteriologic studies revealed that clostridium tetani could no longer be isolated from the wounds in these patients a4 hours after the first administra tion of penicillin. The aiready demonstrated antibiotic influence of penicillin on this organism in vitro therefore, appears to be confirmed in vivo

The use of penicillin in tetanus appears to be most valuable in cases in a hich multiple lesions not all of which can be removed by surgical means, are present or in which no focus of infection is detectable. This antibiotic agent is not intended to replace the admin latration of antitoxin, excusion of wounds, adequate sectation, and maintenance of a normal state of nutrition and hydration, but appears to be a highly important adjuvant to these other therapeutic

McAdam, I W J : Penkellin Treatment of Acute Hematogenous Osteomyelitis. Brit. J. Surg

The liferaving properties of penicillin are discussed, and its limitations in local infection and bone necrosis are emphasized in conjunction with 40 patients in whom penicillin treatment was used The long bones were affected in 32 of the patients. Ane roug outer were entered in 35 of the persons. The must daily dose of penicillin was 100 000 units larger doses were used when indicated. Quite a wide variation in the serum level of penicillin was found

Intramedulary injections of the penicillin produced a higher concentration in the pus. The intra-medullary method is recommended when the in fected metaphysis is intracapsular and there is an almost inevitable septic arthritis. It would appear from the results reported here that a route for the rom an results reported from the metaphysical focus to the infected joint cavity is open. The introduction of a needle into the medulis of an infected bone serves several purposes it allows the aspiration of a subperiosteal abocess it relieves intramedullary tension and it allows a bacteriological diagnosis to be made from the pus in addition, it is used to ad

The length of time that organisms are found in the medullary cavity is very important in order to deckie the duration of treatment. Among 18 pa tients, the average time for staphy lococcal infections to be cleared up was 14 days, and the treatment was continued until three successive daily specimens of

pus proved to be sterile. The temperature chart and leucocyte count were not found to be reliable as guides to the severity of the local infection. Of to patients 31 had a generalized infection, 10 had metastatic foci, and 30 had positive blood culture.

A large table is given in the original article, show ing the details of treatment in 40 cases of acute hematogenom osteomyellitis. Among 32 patients with acute infections of the long bones treated with penicillin, 5 had operative treatment and the remaining 37 were treated conservatively. In 10 of the 40 ing ay were treated conservatives) in to or the 40 patients septic arthritis occurred. This complica tion is most effectively treated by the appration of pen and the local injection of penicilin into the joint cavity every second day Among 22 of the 32 jour carry erery section day Among 22 or the 32 patients who had infections of the long bones, 2 have poor function because of destruction of a joint 1 patient developed a pathological fracture and patients have discharging sinuses. In the remaining 17 patients, good function has resulted.

I enicillin treatment sterilizes bone in an average of 14 days. Before sterilization, however bone damage has occurred, even though it is not evident roentgenographically Immobilization would appear to be advisable until there is roentgenographic evidence of recalcification.

In this series of 40 patients 19 had a staphylococ cal septicemia o had metastatic lesions, and 10 had a septic arthritis there was I death.

RICHARD J BERRETT JR., M.D.

Kirby W. M. M., Leifer W., Martin, S. P., Rammelkamp, C. H., and Kinzman J. M.: Peni cillin in Oil. J. Aw. M. Att. 1945, 189, 940.

Penkcillin becswax-peanut oil mixtures provide an effective and safe means of prolonging the action of penselllin in the body Studies were made of the absorption and excretion of penicillin following intramuscular and subcutaneous injections of 300,000 units of penkellin in a 4.8 per cent becawas in oil mixture. A single injection was administered to 54 patients with acute gonococcal urethritis and 35 patients with primary or secondary syphilis re ceived 8 daily injections, a total of 2,100,000 units in

Calcium penicillin was used rather than the sodium sait because it was less hygroscopic, although there was thought to be no significant difference in the duration of the blood levels or in the clinical results because of the particular salt used. Penicillin was suspended in a 4.5 per cent becawar in oil preparation. Intramuscular injections were made into the gluteal or deltoid muscles, and subcutaneous injections into the subcutaneous thanes overlying the insertion of the deltoid muscle. The variability of absorption and excretion was striking the important factor being the location of the injected material in relation to the muscle tissue and inscial planes, while the activity of the patient was apperently of minor consequence. It was concluded that there must be a continuous absorption from the muscle of a large amount of penicillin to insure absorotion of about 2 500 units per hour Slower more uniform absorption was obtained with subcutaneous miections because there are fewer and smaller blood vessels in the subcutaneous regions than in the deep muscle tissues therefore this route was considered superior although it was used in only 25 cases in

Penicillin levels in the blood and in the urne were obtained in the 89 cases The blood levels were determined by the Kirby Rantz modification of the Rammelkamp serial dilution technique (which detected as little as o o4 units per cubic centimeter) and specimens were taken 14, 1 4 8 12 16 20 24, and 28 hours after the injection. In 69 per cent of the 54 patients with gonococcal urethritis the blood levels were present for no longer than 12 hours and m about half of the 31 per cent in whom the levels were present for from 16 to 28 hours irregularity of absorption during the second 12 hours was noted In only 7 per cent of the 35 luctic patients assayable levels of penicillin were present 24 hours after each mjection. No cumulative effect of penicillin was noted In both groups of patients urine was col lected in 12 hour periods for from 48 to 72 hours and follow-up clinical observations were performed for a minimum of 21 days The excretion of penicillin was found to decline rapidly after the first 12 hours but small amounts could be detected for 72 hours or more. The urinary excretion confirmed the evidence of superiority of the subcutaneous over the intra muscular route of injection

In the one third of the patients who received subcutaneous injections it was observed that the absorption was more uniform and the levels were more prolonged in approximately two-thirds of these patients penicillin was present in the blood in de tectable quantities for 24 hours or more

From the preliminary clinical results it is concluded that, although larger amounts of penicillin are required than with penicillin in saline solution, penicillin-beeswax-peanut oil mixtures provide an effective and apparently safe method of prolonging the action of penicillin in the body It is further con cluded that an injection of the penicillin in oil mix ture (300,000 units) should be made twice a day for treatment of infections in which it is desirable to maintain a therapeutic concentration of penicillin throughout the duration of treatment.

Soreness at the site of injection which persisted for 9 or 10 days was the only significant manifesta tion of the penicillin in oil injections (3 of the luctic cases developed a generalized urticaria) and this was less severe in the subcutaneous administration

PRILIP B CHASE, M.D.

# ANESTHESIA

Pleasance, R. E. Intravenous Anesthesis in the Tropics. Current Res Anerik. 1945 84 231.

This article is based upon experiences at a Base Hospital, and covers a period of 23/2 years with intravenous anesthesia mainly pentothal sodium.

During this period 3 994 of 7 952 anesthesias, approximately 50 per cent, were intravenous anesthesias of some form There were no fatalities in this series and no definite postoperative pulmonary com plications. The operative cases varied considerably and included most types of minor surgery and diag nostic procedures, as well as maxillofacial, plastic orthopedic, and extensive surgery of the cranial vault, chest, and abdomen Pentothal alone was used when possible but the more extensive procedures were performed under a combination of pentothal and some other form of anesthesia, prefer ably gas and oxygen

The author lists the following types of cases as

suitable for intravenous anesthesia

Patients who desire to avoid unpleasant inhalation agents.

Patients who resist other forms of anesthesia Patients who are unable to tolerate a mask over

Patients who have had little or no premedication.

Patients who require a supplement to spinal anesthesia. Patients who are subjected to minor operations

manipulations or examinations under anesthesia. Patients who are subjected to selected major

operations Patients who require an antidote to the toxic

effect of local anesthetics. Patients who are having convulsions from drug

poisoning ether or tetanus.

Patients who require sigmoidoscopic or cystoscopic examinations or application of the diathermic

The tendency toward laryngeal spasm makes the use of pentothal for bronchoscopy hazardous unless an expert in the arts of both anesthesia and bronchoscopy administers the pentothal Lundy's method of reinforcing the preliminary infection after a few minutes of waiting and proceeding to a deep plane is advocated.

The following patients are not suitable for intra

venous anesthesia

Children under 7 years of age Patients with severe liver and kidney disease

Patients with suppuration in the neighborhood of the neck

Patients with cystitis and latent pyelitis

Possibly patients with asthma and those who have been treated with preparations of sulfanilamide, those with dyspnes from any cause, with severe anemia, cachexia and dehydration with cardiac decompen sation, with hypotension, or with varicosities are also unsuitable for intravenous anesthesia

In this extensive series, the author noted some complications such as venous thromboses, severe headache, unusual urticarial-like erruptions, vomit ing, exacerbation of latent malaria, priapism factitation, and intra-arterial infections eventuating in the loss of the extremity

Since barbiturates are broken down in the liver and excreted by the kidneys great care must be exercised in the use of pentothal in a tropical climate, where liver disease or deficiency is comparatively common. The fall in blood pressure and depression in respiration depend upon the rapidity with which the aneathetic agent is injected. The four stages of aneathesis discussed are light narcosis, the "stage of incipration aneathesis, and premortem."

Induction, as well as recovery is quiet, but occasionally the patient is irrational, noisy and hyper active. Whenever possible, the solution (2 5%) abould be freshly prepared at least 10 or 12 minutes before injection. Preoperatively the patient should be prepared as for a general anesthetic, and if the procedure requires a prolonged anesthesia, morphine (gr 36) and atropine (gr 1/100-1/150) should be given. The following techniques of administration are used (a) the single dose (b) the intermittent dose and (c) the continuous dose. These techniques were dependent on whether the case was (1) a simple surgical procedure, (2) a general surgical procedure requiring prolonged anesthesia, (3) a cerebral case, (a) a case of maxillofacial surgery or (5) a case of thoracic surgery Postoperatively routine use is made of one of the detoxicant drugs-coramine, phrenazol, or picrotoxin, and the patient is carefully watched until the return of reflexes or even consciousness. The author judiciously concludes. The ease of its administration may constitute the greatest denger of pentothal." DAVID H. LYRN M.D.

Edwards, G: Tribromethyl Alcohol (Avertin, Bromethol) Proc. E. Sec. 11 Lond, 945 39 71

The author describes the first case narcotized by avertin in England as well as additional experiments with the drug up to the present time. It is now being administered routinely

This drug has had widespread popularity from its initial introduction into England in 1927. In 1936 so per cent of the hospital patients and 69 per cent of the patients in nursing homes were given avertin. However its popularity has wanted since that time during the last 1 as months less than 5 per cent of the

horpital cases and less than 10 per cent of the private patients have received this drug. A 1/10 ga, per klogram dose has been used from the start. The original 3 per cent solution used has been changed in a 2/5 per cent solution used has been changed in a 2/5 per cent solution. The Compo red test was used to determine traces of hydrobromic sch. Rectal plags and postoperative washout were used at first but were soon discarded as worthless. It was soon learned that averties should be given as a basis aneathetic only total aneathesis with the drug was found to be dangerous.

Avertinized nationts retain an active couch reflex. Coramine gives an effective counteraction to an overdose. Although avertin is unlikely to damage a healthy liver it should be avoided if there is any suspicion of impaired hepatic function. It has little effect on renal function and nitrogen excretion. It is not recommended for chest surgery because prolonged basal narcosts is found to be a contributing factor in postoperative chest complications. There is no contraindication to its use for throat surgery It is indicated in hyperthyroid patients and those patients who prefer to be asleep before going to surgery It is contraindicated in inflammations or lesions of the rectum or large bowel, in operations in the region of the rectum, and in any condition which produces a definite deviation from the physical normal, such as fever anemis, obesity cardisc or respiratory affections and renal or hepatic lesions.

The author's present routine consists of administring an enemal from 6 to 1s hours before surgry and giving atropine (gr. 1/100) to minutes following the avertin injection. The avertin dose is 1/10 for a gram per kilogram with a maximum of 8 gm. Trichhorethyl sloohol was used in a group of 18 cases. This drug was found to be more hypomotic and to cause less respiratory depression than avertin. It caused excitement both during the onset of nat costs and during recovery and the eighteenth case presented cardiac failure early during the orset of narrous. For this reason the use of trichhorethy alcohol was discontinued. Mark Kars MD.

# PHYSICOCHEMICAL METHODS IN SURGERY

## ROBNTGENOLOGY

Packard, C. Roentgen Radiations in Biological Research. Radiology 1945 45 522

This article summarizes the study of the effect of the roentgen rays on living cells since Roentgens discovery in 1895 and the use to which these effects have been put in biological research. It was descovered early that x rays were of little use as a bactericidal agent, but that large doses resulted in the congulation of plant and animal cell protoplasm. There was early recognition of the sterilizing effect of the x rays on animals and both radown and roentgen rays have been of use in analyzing the role played by the cytoplasmic portion of the sperm and eag since it has been found that the nuclei of gametes can be injured in varying degrees without pre-

venting cleavage of the egg Three types of chromosome change following irradiation have proved important cytogenetically by causing an increase in the number of mutations and chromosomal aberrations over the rate found in nature, and apparently giving rise to the same al terations in the hereditary material as in the spontaneous cases x rays furnish a valuable means of study of such phenomens. The first of these small changes consists of the increased stickiness of pairs of chromosomes which causes some of them to stick together instead of separating during the maturation process with resultant hereditary changes in the offspring Radiation may increase the frequency of this phenomenon over that found in the offspring of nonirradiated parents by as much as 20 times. The second of these changes consists in the sticking together of certain portions of the chromosomes and their subsequent breaking apart under the pull of spindle fibers with subsequent reattachment of fragments either to the same chromosome in their original orientation or in reverse position or to the broken ends of other chromosomes. Precise deter mination of the chromosomes involved and the fate of their parts has been achieved in careful experi-ments. The third effect is a change in the gene itself which greatly increases the mutation rate (Muller in 1927 working with drosophila) this increase is proportional to the amount of energy

absorbed.

Sensitivity to radiation changes rapidly during mitosis, but whether prophase metaphase or telephase is the most vulnerable period is still in dispute. It was demonstrated by Bergonie and Tribondeau in 1906 that the sensitivity of cells in general varies with their reproductive capacity and inversely with their degree of differentiation, and it has been established that during the development of an organ in there is a progressive loss of sensitivity. All though decrease in sensitivity is synchronous with decrease in growth velocity experiments which

induce increase in the normal growth rate have not produced a comparable increase in radiation effect. It appears that when cell division and metabolism are at a minimum as during chilling cells have a better opportunity to recover from their injury but Henshaw and Francis working with wheat seeds found no quantitative relation between susceptibility and water absorption oxygen consumption and mitosis although sensitivity rises when water is absorbed and growth commences.

There is general agreement that the primary effect of irradiation on the tissues is an ionisation, resulting in transformation of complex molecules to simpler ones but the precise point of primary attack and the pattern of chain reactions which may be precipitated has yet to be worked out. A rays have been repeatedly shown to have no direct effect on oxygen consumption but work by Crabtree and Gray indicates that they have an effect on glycolysis and work by Dale that they inactivate dilute carboxypeptidase while Sparrow states that perhaps the sensitivity to x rays may be correlated with the nucleic acid metabolism.

In 1904 Keemicke demonstrated the ability of organisms to recover from x ray injury but it was not until 1932 that Henshaw offered quantitative data in proof of the generally accepted principle that when x ray intensity is low the rate of repair is sufficient to balance the rate of injury. He found that when arabacia eggs are irradiated and then fertilized, he onset of division is delayed the delay being an exponential function of the time interval between the end of exposure and the moment of fertilization and the period of recovery apparently being limited to the quiescent interval between ir radiation and fertilization.

LILIAN DORALDOOM, M.D.

Sinberg S.E., and Burman, M S: Roentgenologic al Visualization of the Fractured Temporal Styloid Process. Radiology 1945 45 599.

The roentgen visualization of the temporal styloid process is often difficult. The lower part of the bone may be seen in posteroanterior roentgenograms made for the demonstration of the maxillary sinuses, in the open mouth view of the edentialization patient, and in the lateral view of the nasopharynx and neck, but the entire bone is shown rarely

The authors became interested in the roentgen visualization of the styloid process in connection with a rather unusual cases which are described in the text and illustrated with their respective roent genograms.

A technique developed from that of Kaplan was found to be of definite value. It is given as follows For visualization of the right styloid process, the patient is seated in the right oblique position (about x degrees) with head bent to the right at an angle of

about 10 degrees. The head is extended about 10 about to negrees the mandible out of the line of the actives to mine the manning one or the manning and any of the patient s ayyon, the cameric is placed upon the patient at the shoulder and held firmly against the side of the neck and head by his right hand. The veray tube is set from so to 30 cm. to the left of the patient approximately to cm. anterior to and at the level of the patient a kneer. The tube is then tilted appeared about 45 degrees and backward about 30 degrees, so that the central ray enters the left side of the neck in an oblique and upward direction from 3 to 4 cm. below the angle of the mandible

By making use of this technique the authors were able to demonstrate a fracture of the temporal st) loid process in both cases.

Renander A.: Roemtgenologically Examined Case
of Cancer of the Thrums Gland (Roetenoloracial interachier Fall von Cland (Roetenoloracial force).

The concentus of reentgenologists is that roent genegating of malignant tumors of the thymns grand are not characteristic enough to allow a definite diagnosis. However Lenk called attention to cer tain features which permit a correct diagnosis in a tam sectors which permit a correct magnon in a large percentage of cases. The author of this article arge puternage of cancer of the thymus gland in which the picture differed in certain respects from that considered as characteristic for malignant tu

According to the prevailing opinion the medullary substance of the thymns gland is of entedermal origin and therefore belongs to the epithelial structures same the cortical substance is formed mostly by cells deriving from lymphocytes. It follows that malignant meduliary tumors of the thymus gland may be considered executomas while cortical tumors may oe consucron carcinoma, while correct immorphology to the group of lymphoarcomas. This classification must be kept in mind when x ray irradiation is employed for diagnostic purposes because a car a companyed to the thymin stand is very radiorentiant cusoms or the taymus gand is very regionerations while a stream yields to the therapy promptly resembling the lymphotarcoms of the mediational control of the mediations. semants on the respect. In this manner a carcinoma can be differentiated from a lymphosarcome.

The clinical picture is dominated by pressure symptoms. Frequently signs of congestion in the aympuons. Frequency was a conserved and an original and an original step in the superior vena cava are noticed later on dyspines, cacheria and metastases develop

According to Lenk, malignant tumors of the thy mus gland located in the anierior mediastimum form more or less symmetrical tunefactions which as a rate reach the base of the heart. In contraditioning to glandular tumors located in the antenor meditato ganatuse tumors forceton in the america measurements thank the upper border of a thyrous tumor does not reach the juguidum. As a rule styrous tumor does a rounded shape with polycycle, marging, while the control of the control o as a remain maps with payer on making white glandular tumors form relatively short arches. Long arch formations are characteristic for thymns tu more. Contrary to glandular tumors the transverse diameter of thymns tumors exceeds that of the longitudinal diameter this being due to the growth of

thymus tumors within a preformed capsule. In rentgenograms the thymus tumor forms a shap outline unless the tumor mass penetrates the capate and infiltrates the adjacent pulmonary theres. A thymus tumor usually causes a displacement of the taymus tumor tomany causes a correctly follers, and anentysms are characterized by an asymmetric al shape

In a case of malamant thymns tumor in a 75 year in a case or management traymus trums in a 73 year old man observed by the author, the type of the out man observed by the author the type of the mediational fumor could not be determined from memasumar tumor count not or uncommon mem gennageau). A percent of the parent marks and an enlarged cervicel gland suggested malignancy. The diagnosis was supported by the asymmetrical shape and an extension of the mediatinal fumor into the fight cervical region A complete regression of the right convices gland under the influence of 1-ray treatment supported the diagnosis of malignancy of a lymph gland. On the other hand the outlines of a tytulut giant. On the contemporaris were sharp long polyo die arches were noticed, and the transvene power of the shadow was alightly longer than the constitution of the microscopic examination of the microscopic examination of the tumor revealed a cancer of the thymns stand

Dunner L. Hermon, R., and Begnall, D. J. T.,
Pneumoconiosis in Radiator and Boller Fig. Inhers. Bell, J. Radial 1945 181 377

Chest roentgenographs of 13 boiler fettlers and additor finishers aboved signs of poeumoconoist in Chesta and Assablica Sample Late, and the About in Only 2 had duabling complaints and the chest films of 1 of these 2 firm were essentially negative. The authors attribute the reentgenegraphic finding toe autoors attribute the recutemographic minings to inhalation of dust consisting of and (from the casting mods). For, and oil. The exposure maged from 9 to 36 years.

An analysis of 3 dust specimens, which were obtained by different collecting methods, showed that the content or from ranged up to 6 5 per cent depended on the size of the particle. The amount of soluble will be soluble and the size of the particle. of solable silica did not exceed 0.45 per cent. The average size of the particles was 5 micross in the antiltered specimen.

Wilson, A. K.: Roentgen Examination in Con-fectual intention! Obstructive Defects in In-fants. Am J. Roentf. 1945, 54, 495.

The author presents 3 cases of congenital obstructing anomalies of the intestinal tract in newborn infants, and describes the rocatgen techniques used in accretaining the point of obstruction. For cases of imperiorate anna and rectal atresis bo

uses the method described by Wangensteen and Rice these the helical described by wangements are conin 1900 whereby 52s in the large intentine is used to
delibeate the bland end of the rectal pounds by grathese the bland end of the rectal pounds by grapending the infant head down and placing a radio-Paque object In the anal dimple. This demonstrates the extent of separation between the blind end of the rectum and the perineum to aid the surgeon in deter mining whether a perincal approach is feasible. In

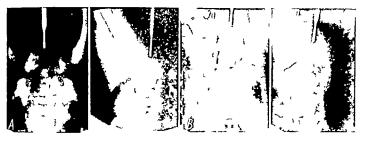


Fig. 1 Case 1 Anteroposterior and lateral views made (a) immediately (b) 5 minutes after and (c) 10 minutes after the infant was suspended head down. Note gradually increasing ascent of gas in rectal pouch, and that there is greater clarity of detail and less risk of erroneous measurement in the lateral projection. The tip of the thermometer is in contact with the anal dunde.



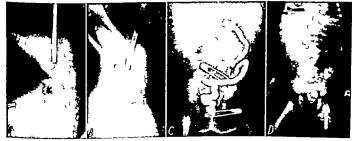


Fig. 8 Case 5. The findings in (a) reproduced from a roentgenogram made to minutes after the infant was subpreded head down, show evidence superstive of high rectal imperioration. This was disproved by insuffaction of air (b)

and the injection of iodized oil (c) The partially calcified enterocyst is seen in (c) and (d) in close proximity to the mobile proximal end of the colon.

cases showing an anal pouch, injection of opaque medium is recommended for an accurate estimate of the depth of tissue between the anal membrane or

perineal surface and the blind end of the rectal pouch. In one of the cases presented a per cent lactose was given by mouth some hours before examination in order to increase cas formation in the bowel in the newborn. Roentgenograms were then made at least and preferably to minutes after the infant was inverted in both the anteroposterior and the lateral projections. It was found that if films were made immediately after inversion the gas might not have reached the distalmost portion of the rectal pouch whereas the gas localization after to minutes corresponded well with subsequent surgical findings. The lateral projection was found of greater value in estimating the thickness of the tissue between the rectal pouch and the perineal skin surface since the pelvic curve of the intestine foreshortens the distance between these points in the anteroposterior view The latter projection may be of value however in demonstrating possible deviation to the left or right of the terminal end of the rectum.

The first case was that of a premature male infant, with no anal onfine but with an anal dimple. It was given 16 ounce of 5 per cent lateries by mouth approximately 12 15 and 18 bours after birth, and at a bours was supposed the down with a thermometer tip in apposition to the anal dimple. Anteroposteries and lateral films were taken immediately and 5 minutes and 10 minutes and

neous margin.

The second case was similar to the first. The third case was that of a premature female infant who developed persistent projectile vomiting about a hours after birth. The first films (Fig. 2) made as hours after birth by the method described tended to support the clinical impression of high rectal atresia as there was considerable distance between the tip of the rectal catheter and the col lection of rectal gas. The insuffiction of air and injection of 15 c.c. of loduzed oil however, demon strated free passage up the colon as far as the transverse portion which was displaced to the left by a large movable partially calcified cystic mass. In spite of fleostomy the infant died to hours after birth. Autopsy showed a large enterocyst joined to the terminal fleum by a fibrous strand and to the mid fleum by an almost atretic loop while the terminal fleum ended blindly a few centimeters from the colon.

Cases 2 and 3 were the only cases of imperforate arus or intestinal atresiz found among 9,474 living babies born in the Hospital of St. Vincent de Paul Norfolk, \a. between 1933 and 1944.

LILLAN DONALDSON M.D.

Issue, Fr Roentgen Findings in Amelic Disease of the Liver Radiology 1945 45 551.

The author calls attention to anothe disease of the liver manifeated first as a diffuse hepathis and progressing in some instances to the formation of solutary or multiple liver abscesses, as the most common complication of amebic dynentery and to ports that of the size case of such dynentery reviewed at an Army hospital overseas, 32 (14%) were disposed as presenting liver involvement.

The conet of this complication is usually indifices with only anoreus malaise, and vague epigatic distress with the result that the patient may not appear for diagnost until several months after initial attack of districts, and then usually with only low grade fever moderate leuccytosis, an elevated sedimentation rate and tendemoss over the liver without any frank pathognomonic signs on physical examination. For this reason the author believes the associated roentigen changes, if present, may be of considerable help in superstine or chocking the

diagnosis

Of the 32 cases diagnosed as amebic benatitis 12 were examined roent renologically, of these, 10 (45%) showed elevation of the right less of the disphraum In the chest films, and fluorescopy movement of the diaphragm was reduced or absent. In regions where amebic dysentery is prevalent, the author re gards these roentgen findings pathognomonic of ameble liver disease. Secondary compression of markings in the base of the right lung frequently accompanied the disphragmatic elevation and oc casionally there was a little pulmonary infiltration. In a few instances minimal right costophrenic pleuritis and effusion were also encountered which the author believes was due to rupture of a liver abcess into the pleural cavity. Prone abdominal films were not always helpful, but in some cases they did show a downward extension of the inferior hepatic border as related to the costal margin-

repairs borner as related to the continuaging a course of emetine therapy these roentgen signs disappeared but more slowly than the symptoms. In only a very small percentage of cases did anothel liver disease require aspiration.

LIMAN DOMINGON M.D.

Brooke, II. H. W., MacKenzia, W. C., and Smith, J. R.: Pneumoroentgenography with Organ in the Distincts of Internal Derangements of the Knee Joint. Am. J. Reedy. 1945, 54, 462.

The authors used oxygen pneumomentgenography for the diagnosis of internal derangements of the knee joint whenever the clinical evaluation remained inconclusive and the routine reentgen examination falled to help although the symptoms strongly suggested some sort of disability

A total of \$5 cases were examined of which 18 showed positive findings. Ten cases came to operation and in all but 1 the rountgen findings were confirmed. The failure in the tenth case was attributed to insufficient removal of the synovial fluid and in complete failing of the joint cavity with orygen.

The authors give in detail the anatomic and surgical considerations. The procedure must be done in the operating room under aseptic conditions. From roo to 140 cc. is the optimum amount of coryen necessary for good filling. Collodion is spolled to the needle puncture site and then the patient is taken to the roentgen department on a stretcher. Roentgenograms are made in standard pontions. The use of the curved casette holder and multiple stereo projections are however of definite value.

In the interpretation of the abnormal pneumoroentgenogram of the knee joint the following points were found to have diagnostic significance (1) roughening and narrowing of the cartilage surfaces either of the articular surface coverings or of the semilunar cartilages (2) uninterrupted gas columns along the inner aspect of the collateral ligaments of the joint where capsular structure should be firmly attached to the periphery of the menisci (1) in creased density in the intercondular or nonarticular region with a corresponding lack of density in the lateral or medial region of the joint (4) separation of the menucus shadow from the contiguous bone structures (5) calcified and more especially non calcified loose or semiloose bodies (joint mice) (6) narrowing of the joint space and (7) exostosis or churnation of the articular surfaces. The last three findings can also be demonstrated in the routine roentgenograms of the knee,

The conclusion is reached that the method is a useful adjunct in well selected cases. Under aseptic surgical conditions it carries little risk of complications.

Theocorta, M.D.

Coolidge, W D and Charlton E. E.: Roentgen Ray Tubes Radiology 1945 45 449

The authors describe the technological development of x ray tubes from the simple gas discharge tube first used by Roentgen in which the glass wall of the tube functioned haphazardly as the x ray emitting target under bombardment by electrons to the one hundred million volt circular induction electron accelerator tube, which promises to become not only a widely used instrument in medicine and industry but also a source of unpredictable scientific information.

There are essentially 3 groups of x ray tubes I Gas filled tubes, most of which operate with a cold cathode. They are antiquated mainly because of their instability and the impossibility of controlling the current passing through them and of choosing the voltage applicable to them independently from current and gas pressure.

2 High vacuum tubes with a cold cathode (socalled field current tubes) which did not gain ac

explance for similar reasons
3. High vacuum tubes with a hot cathode. This
type of tube is the only kind used extensively today
It was developed by one of the two authors (Cool
idge) whose name it bears. Encouraged by the work
of Langmuir he developed a hot cathode which con

sisted of an electrically heated tungsten filament whereas Lihenfeld tried to solve this problem by introducing an auxiliary hot cathode which produced electrons in a sensite invitor than her bear

duced electrons in a separate ignition chamber Coolidge tubes have now been developed to cover a wide range of usefulness. They vary in size from that of an oil immersed dental tube with a bulb diameter of 11/4 inches and a length of 4 inches up to that of the 1,400 000 volt tube of the National Bureau of Standards which is 12 inches wide and 24 feet long. The effective wave length of the radiation generated in such tubes ranges from 0 00025 Ang strom at 100 000 000 volts to 25 o Angstrom at 1000 volts (A table showing the relationship of the factors is given.) The efficiency of these tubes in creases with the voltage. Whereas at 06 000 volts only o z per cent of the cathode ray energy is transformed into x rays in the target, the measured efficiency reaches 10.4 per cent at 2,350 000 volts (A table showing the wave lengths and the efficiency relation is given also ) The advantages of Coolidge tubes over others are described.

Further technical developments are as follows

For roentgenographic tubes

Development of a rapidly cooling tungsten target brazed into a solid or hollow copper block which in turn is cooled by (r) possessing a large heat capa city (2) with stagnant or circulating air by means of radiator fins, (3) with water and (4) by a spontane ous or forced circulation of oil passing through the back of the target which in turn is cooled by air or other media.

Development of the line focus a rectangular focus which by having a slant of 20 per cent (the angle being made by the target surface and the central x ray beam) appears foreshortened in the useful projection, thus equaling a quare focus. This line focus is able to withstand the 3 fold load of an ordinary focus of the same projected suc. (Values for other angles and curves for load limits are given)

Development of target sizes varying from r to o mm. in diameter for different purposes. The allow able loading varies from about 50 to 600 watts per square millimeter

Development of double focus tubes Tubes having two fool of different size allow rapid changeover from flouroscopy to roenigenography which is necessary for the so-called spot film medical reentgenography and other two purpose raying

Development of a rotating target which allows the constant advance of relatively cold metal to the electron bombardment during a given exposure. In modern rotating target tubes the anode disc rotates with from 3000 to 3500 revolutions per minute. The gain in loading over the stationary target, is then about to fold and is generally proportional to the target speed. (A table for the various speeds and exposure times is given). The line focus principle is maintained in these tubes. Technical difficulties with the target bearings still cust but have been overcome in part by coating the bearing balls with silver or barium.

For thera by tubes

Development of improved cooling of a solid tung sten target which is allowed to heat up to high temperatures. Since an x ray treatment may last for up to an hour the tubes have to be designed for continuous operation (The focal spot is allowed to be larger than for diagnostic tubes.)

Insertion of a beryllium metal window into the glass wall of the x-ray tube for superficial therapy to allow the passage of very soft x rays from x to

10,000 volts for superficial therapy

The use of thick walled pyrex glass for from 200 to 400 ky deep therapy tubes to prevent the occurrence of punctures.

The use of a metal hooded target to improve the electric field distribution. This will not allow the secondary electrons commanding from the target to reach the glass wall and thus cause punctures. The metal hood may be made to include a beryllium window.

Use of the x ray beam "transmitted through the target instead of the conventionally used "re flected beam. This principle is of value for the operation of contact and body cavity tubes. It is a necessary one in the use of supervoltage matchines if the voltage is to exceed several million with several results.

f the peculiar angular distribution of highly pene

trating x rays. (Data for the angular distribution at various voltages are given.)

Development of multisectional tubes for 1,000,000 years in machines which allow a more even distribution of the voltage gradient within these tubes by the see of a number of ring shaped electrodes connected to different intermediate voltages. This principle is of special value in the 4,000 000 volt mobile resonance transformer until in which the tube is urrounded by the transformer coils and the electrodes connected to a number of croil tare.

For diffraction tubes

Use of several windows permitting the simultaneous diffraction or spectrographic study of several specimens. Diffraction tubes operate usually on between 30 and 45 kv and utilize the characteristic radiation of various target metals, e.g. copper and molybelemy.

For all types of tuber:

Development of x ray proof and shock proof tabe housings. This more than anything else enables us to enjoy the use of flexible comparatively safe x-ray equipment without which modern radiology is unthinkable.

Most of the described technical advances were made possible only by the Coolidge tube principle.

# MISCELLANEOUS

# CLINICAL ENTITIES—GENERAL PHYSIO-LOGICAL CONDITIONS

Loutit, J. F., and Maunsell K. The Prevention of Homologous Serum Jaundice Brit. M. J. 1945 2759-

Homologous serum jaundice occurs from 40 to 160 days after the introduction of a foreign homologous serum into a recipient. Its occurrence may be acci dental, as in so-called syringe jaundice which is believed to result from the injection of traces of foreign blood left in an inadequately cleaned syringe, it may occur following the deliberate injection of serum or plasma as a transitusion or of convalescent serum given as a prophylactic in measles and mumps or following yellow fever vaccination in which human serum is the suspension medium for the killed virus. As to the accidental variety adequate cleaning and sterilization of syringes and needles has been shown to reduce the incidence of paundice practically to zero When the introduction of serum is deliberate the prevention of homologous serum jaundice is much more difficult. The yellow fever vaccine problem was solved only by giving up the use of serum as

a suspension medium This report deals with the results of the introduction of single sera into a number of recipients and a comparison of the incidence of jaundice in these cases with that in a series of cases subjected only to blood transfusions. Blood was drawn from 99 seps. rate donors under sterile conditions, of these 76 had had no previous known attacks of jaundice 15 had had jaundice apparently from infective hepatitis, for some months to many years previously 4 had had homologous serum jaundice some months previously, and 4 were donors who had contributed the only blood which had been used for transfusion to a man with hematemesis who 6 weeks later de veloped jaundice. Of 98 donors followed up for 4 months 94 had no complaints 3 had bilious attacks r donor had a skin rash and none had jaundice. Of 602 recipients of sera from the 99 donors 573 could be followed none of them reported jaundice but 11 reported billious attacks and 3 reported skin rashes. It is probable that the bilious attacks and skin rashes were nonspecific in both series

For comparison 213 patients who had received whole blood or concentrated red cell suspension were studied over a period of 2 months or more. No case of frank homologous serum jaundice occurred in this series although there was 1 case of jaundice diagnosed as infective hepatitis and 1 case diagnosed as hepatitis without jaundice. The findings confirm the impression that homologous serum jaundice comm only rarely after transfusion with whole blood. This is probably due to the fact that patients receiving transfusions of whole blood alone get homologous material from a few donors only get homologous material from a few donors only

In addition to this follow-up only a cases suggesting a relationship between whole blood transitution and subsequent hepatitis have been found. In these cases blood was received from more than 1 donor (a and 22 donors respectively). It is recommended that for therapeutic and prophylactic purposes the serum used should be from a single individual, or from a few persons only.

JOHN L. LINDQUIST M.D.

Harrison F F., and Miller J K.: The Problem of Hemolytic Streptococcus Carriers in Hospital Personnel. War Med Chic., 1945 8 333

A situation is described in which the occurrence of a postoperative infections in asceptic cases seemed to be related to a high hemolytic streptococcus carrier rate among the surgical personnel. The carrier rate was not effectually reduced by chemotherapy A comparison was made of the incidence of streptococci in the throats of the surgical personnel and of the patients and in the wounds of patients during the winter months of 1944 and 1945. The authors suggest that as a precautionary

measure periodic surveys of the flora of the throats of surgical personnel be made.

WALTER H. NADLER, M.D.

Snell A. M., Wood D A., and Melenberg, L. J.: Infectious Hepatitis, with Especial Reference to its Occurrence in Wounded Men. Gatteenter obsp. 1945 5 241

Infectious hepatitis has currently manfested it self as three more or less distinct discal entities the common epidemic jaundice, pastvaccmal (yellow fever) hepatitis and homologous serum jaundice There is no reason to presuppose any fundamental difference in these conditions, the clinical variations probably being due to the route of inoculation and to the general condition of the affected individual While the supposed relation of the three syndromes is not proved it is generally agreed that all fatal cases of any of the three types have shown a common picture at autopsy namely that of acute or subacute (yellow) atrophy of the Fire?

This report deals with the cases of 33 patients who developed jamidee on an average of 34 days following a wound. All of the patients had received blood and plasma at the time of injury and it is believed that the ensuing hepatilis may have resulted from an interogenic agent contained therein. Twenty are of the patients recovered, the remaining 6 expiring on an average of 1 week after the jumidice was first noted. The initial symptoms at the time of the appearance of hepatilis were short dentical with jaundice. Anoresia nasus, sweet central injuries of the patients of

patients, including the 6 who died, developed marked symptoms and signs of involvement of the central nervous system. Suprisingly, the liver and spicen were rarely palpably enlarged in the early stages of the disease Cephalin-cholesterol flocculation tests were positive in all of the patients at some time dur ing their filmers. Although the studies of the hepatic function were limited to those required by medical necessity all of the studies revealed less deviation from the normal than might have been expected. Essential pathological findings in the liver in the 6 fatal cases consisted of an acute autolytic process which was diffuse and most marked in the central and midzonal areas of the liver lobule. Little evi dence of regeneration or repair was observed in these cases presumably because of their brief and violent course.

There was no endence that the disease had been transmitted by dropbet infection to other patients in the ward. A laboratory worker who funderentially drew up a mentiful of around from a fast case developed a mild form of the disease 10 days later. There is ample evidence that the preacter's phase of hepatitis may be detected clinically in these cases, as in the experimentally produced variety of the disease. In case it was predicted that jaunadice would develop on the basis of two positive explain cholesterod focculation tests on x different days. From this and similar observations it is believed that the explain-cholesterod focculation tests occurs positive long before clinical symptoms develop and is probably the earliest evidence of an impending acute hepatitis to be obtained in wounded

men. The authors could not be certain that these cases of severe hepatitis were due to what has been called homologous serum or transfusion laundice. The incubation period corresponded closely to that seen in hepatitis following yellow fever vaccination and in experimentally produced serum paundice. The aver age course prior to the development of serious symptoms in post vaccinal hepatith is about 26 days as contrasted to 3 or 4 days in this series Two possi bilities suggest themselves as to why the disease should follow so serious a course in the wounded men in this series (1) that the amount of icterogenic material was very much larger than that trans mitted in vaccinal hepatitis or in experimental serum jaundice and (s) that the general autritional depletion of the wounded men makes them especially vulnerable. The latter view seems the more reason ablc.

The essential requirement for the prevention of serum jaundles in wounded men is elimination of the use of blood or plasma containing the leterogenia agent. The practical difficulties of doing this are great. The prevention of fatallities from serum sandice occurring in wounded men must begin with the maintenance of the general nutrition of the patients and the correction of protein and vitamin deficiencies if such exist. Early detection of the pretiertie phase is also a matter of considerable importance as specific treatment may save lives and shorten convalescence. Jone L. Lunguigt, M.D.

Dorgeloh, J. R., and Tuily, P. W.: The Relationship of Boeck a Sercold and Tuberculosis Report of a Case in Which Tuberculosis of the Lymph Nodes was Associated with Festimes Highly Suggestive of Sercold. Arch. Path Chir., 1945 49, 399.

Tuberculosis of a cerrical lymph node was found in a patient exhibiting no cutaneous reaction tuberculin. Portions of the lesion presented caseston with acid-tast bacilli in other area, lowever the histological picture was indistinguishable from that of Boeck's sarcold. It is believed that this case lends additional weight to the argument that sar coldosis, in some instances at least, is an atypical reaction to tuberche bacilli or their product or the same of the same content of the same of the same content of the same c

That this relationship may occur even though bacilli anually are not demonstrable in the leason astrodorsh is substantiated by the occurrence of the organism free "M" reactions of leproay and myorth infections and the generally conceded relationship of attroptococci to rheumatic fever and glomerulone platfits.

Summ Kars ILD.

Kline, B. E., Miller J. A., Rusch, H. P., and Baumann, G. A.: Certain Effects of Dietary Fats on the Production of Liver Tumors in Rate Fed p-Dimethylaminousobensens. Comm. Eur. 1945, 6

Six groups of 15 rate each were fed o.o. per cent of pollmethylaminosusobenees for 4 months in synthetic diets containing (1) no fat, (1) 5 per cent of corn oil, (2) 5 per cent of corn oil, (2) 5 per cent of corn oil (2) 5 per cent of corn oil (2) 5 per cent of corn oil (3) 5 per cent of corn oil (4) 5 per cent of clard. Then a dye free diet was given for s months. A final limitedence of liver tumors of 25 per cent was produced by the low fat diet, as compared with was not of the cent of the c

These data demonstrate the fact that, in general, pointerly similar solutions is the carcinograde when the diet contains fat they show further that the incidence of bepatomas is higher in rats given a diet containing so per cent corn oil than in those receiving a diet with 5 per cent corn oil. It is, therefore apparent, that the level of the fat in the diet, as well as the type of fat, is important for the formation of hepatic tumors by p-dimethylamilozato-bensene.

Khanolkar V. R., and Suryabai, Bi Cancer in Relation to Usages: 3 New Types in India. Ark. Path., Chic., pas. 40, 351

Three new types of cancer are found in different regions of India namely Bombay \rangepatam,

# MISCELLANEOUS

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Effects of Lawrence, W.E., and Blair C. on the Dog Arts Patt Chic, 1945 40 250. the seat of the cancer is equal in importance to that played by the careinogenic substances themselves. taken in dogs and the animals fore maintained months after the massessing business. Saphir O., Appel, M., and Levinthal D. II : At Long Bones by Mechanical Trauma In the Camera, According to the Camera Camera, taken in dogs and the animals were maintained actival months after the operation. During the carbohydrain maisbolium was accounted to the status of the tempts to Localize Tumor Metastasses in the Roy, 1945 5 722

Mechanical Trauma Cencer fatter stages of their survival the status of the metabolism was assayed on a quant This experimental study was undertaken in order This experimental study was undertaken in order income match the influential in the localization of tative basis SCRIAL ACCESSION, COSSALION OF ETOTTH and a

Scaul regression, cossation of growth and a comity be reliably associated with the removal of the to accertain whether of pot trauma applied to the marked change in coat were the only effects that coars anisotropy associated with the removal of the control of 'ng bones might be influential in the localization of the latest from a transplanted malignant timor. Which is highly Medical from a transplanted matignant tumor matignant tumor which is highly throughout the study Attempts were a size COURD OF CRUBDLY RESOCIATED With the removal of the Avidate reserves the continuous of the Carbon and magnitude of para anterior per ac the lowering of the carbon in the interior and a decrease in adversal time. maignant and readily transplantable into the letter made to localize metastage in the long home for a second or the long home for a second or the long home for the long home hydrate reserves the occurrence and magnitude of the Housesy effect and a decrease in advent func was used throughout the study Attempts were made to localize metastases in the long bone by a winola mechanical training and by change irritation the Housey effect and a decrease in advent tine and size were associated with the progressive sequent to total removal of the hypophysial stalk progressive materials. The greater the encroachment on the made to localize metastases in the long bones by a long mechanical trauma and by chronic utilation. Tabbuta except in the animal column, and then have Jabbus accept in the not been observed in the stock rarely. In order to determine whether or not then the plant of the pla sequent to total temoval of the para anterior and the posterior lobe. The street of the energy anterior and the stack the opposite the energy them there the Posicior food the steater the encounterfunction the state the steater were these deficits. There facts that the rays tuberals moment. Tarety In order to determine whether or not the plants were made directly into the femur 10 onthing. The lummer crows well within the man. state the Steater were these deficite. These facts elaborates in common with the part tuberally normally in common with the part. seem to inducate that the part tuberaits normally in common with the part executed of the part tuberaits normally in common with the part of the part

plans were made directly into the femuring normal male rabbits. The tumor steep well within the many town spaces in all country and well within the many adjacent musicles and metastasticed extensively many to the bones was moduced by amole was moduced by amole. elaborates (Presumably in common with the Pate maintenance of these functions are essential for the maintenance of these functions There was executally no accumulation of fat in adjacent muscles and metastastic extensively fracture to the bones was produced by simple the large was fractured and immediately. There was executally no accumulation of fact in flowers of animals showing a nearly maximal Obesity occurred following the livers of animals above a nearly maximal (i) hypophysiconemos above a nearly maximal the hypophysiconemos (bleathy occurred following crack-posts and the hypothysiconemos restricted the stalk plus encoughment on the hypothysiconemos and (s) plus to the hypothysiconemos and (s) section of the hypothysiconemos and (s) sect Institute of the authority. In a series of 21 tablets afforces of an intravenous injection of a encounter the authority of a encount age lest namerus was leacured and immediately of immediately made injection of a suspension made into the contract of the cont Allerwith an intravenous injection of a suspension of timor cells was made into the car vein. In a

of lumor cells was made into the ear vent in a second series of 13 tabbits the humorus was vent in a sond residence as similar interview, was made in a Croachment on the hypothalamus and (4) section of the hypothalamus and (4) section of the hypothalamus which followed hypothalamus hypothalamus in hypothalamus second series of to rabbits the humanus was tractured a similar injection was made. In a summary of the human was tractured to human was tractured to the human was tractured to the human was tractured. the state plus encroachment on the hypothalamus ment was definitely pathological and that following hypothalamic invoke the properties of the pathological and that following a state of the pathological and that following to have And 14 days later a similar injection was made. In a similar injection was made. In a similar injection was made. In a similar injection was later to the composite state. third series of 3 animals the illinoir was transnearly regular from a man analy realizable test after the
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infingement on the hypothalamus in addition to a removal of the hypothalamus in addition to a carbohydrate metabolism and address the deficits are materially from districtions of intracedicular transplantation of tu-Interactions of interacticular transplantation of the management o In CIPONYURIE DECEDORISM AND AGREEMENT STREET STREET, THE STREET STREET STREET STREET, THE STREET STREET STREET, THE STREET STREET, THE STREET STREET, THE STREET STREET STREET, THE STREET STREET STREET, THE STREET STREET STREET, THE STREET STREET, THE STREET STREET, THE STREET STREET STREET, THE STREET STREET STREET, THE STREET, THE STREET STREET, THE S year submaximal or and not deviate materially from the normal. This suggests the possibility that endocrine principles are elaborated in the immediate DOL WAS GODE UNIT THOSE STITUTES THAT I THE CONSIDERATE THAT I THOSE STITUTES THAT I THE CONSIDERATE THAT I THE CONSIDERATE STATE OF THE CONSIDERA Reent senectain and automa studies of the mass and surface of tumor cells at either the normal. And success the possibility that endoenvirons of the hypothelemic and the immediate

and the immediate. Crine Principles are encounted in the immediate children have actions contrain to the armonal and that these principles are contrained as a section of contrained and contrained for the section of contrained contrained contrained for the section of contrained contr envirous of the hypothiliamus and that these prince has known hypothiliamus and that these principles known hypothicial trainfolders of certain ciples have actions contain to the actions of the known hypophysial principles

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done on hypophysectomized animals it is necessary not only anatomically but with respect

patients, including the 6 who died developed marked symptoms and signs of Involvement of the central nervous system. Suprisingly, the liver and splien were rarely papably enlarged in the early stages of the disease. Cephalin-cholesterol flocculation tests were positive in all of the patients at some time during their illness. Although the studies of the bepatic function were limited to those required by medical necessity all of the studies revealed less deviation from the normal than might have been expected. Essential pathological findings in the liver in the 6 fatal cases consisted of an acute autolytic process which was diffuse and most marked in the central and midsonal areas of the liver lobule. Little evidence of regeneration or repair was observed in these cases, presumably because of their brief and violent

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Dorasioh, J. R., and Tully, P. W.: The Relationship of Bosck a Barcvid and Tuberculosis Raport of a Case in Which Tuberculosis of the Lymph Nodes was Associated with Festure Highly Suggestive of Sarcold. Arck. Path., Chc., 124, 26, 50.

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Kilne, B. E., Miller J. A., Rusch, H. P., and Baumann, C. A.: Certain Effects of Dietary Fats on the Production of Liver Tumors in Rate Fed p-Dimethylaminoszobenzene. Cancer Res. 1946, 6

Six groups of 15 rats each were fed o.o. per cent of pdimethylaminocarobenance for 4 months in synthetic dieta containing (1) no fat, (3) 5 per cent of corn oil, (3) 5 per cent of love oil, (4) so per cent of corn oil and. Then a dy elree diet was given for a months. A final incidence of liver tumors of 25 per cent was produced by the low fat diet, as compared with 04 and 35 per cent, respectively when the diet contained 5 per cent of corn oil or oilve oil. When 20 per cent of corn oil or oilve oil. When 20 per cent of corn oil or oilve oil. When 20 per cent of corn oil has fed to the rats, large tumors at this time was 100 per cent. When 20 per cent of Corn oil was 100 per cent. When 20 per cent of Corn oil was 100 per cent. When 20 per cent of Corn oil and was given, the incidence of

tumon at 6 months was 87 per cent.

These data demonstrate the fact that in general, p-dimethylaminosaobenzene is more carchospenis when the diet contains fat they show forther that the incidence of hepatomas is higher in rata given a det containing so per cent corn oil than in those receiving a diet with 3 per cent corn oil. It is, therefore, apparent, that the level of the fait in the diet, as well as the type of fat, is important for the forms tion of hepatic tumors by p-dimethylaminosamentain.

Khanolkar V R. and Suryabal, B: Cancer in Relation to Usages: 3 New Types in India. Arch. Path., Chic. 1045 40:351

Three new types of cancer are found in different regions of India, namely Bombay Viragapatam

# MISCELLANEOUS

and Paina. They may be called the dhoti chutta, and khaini cancers. They are associated with the cancers that the state of the shade of the state of the shade of and knami cancer. They are associated with the wearing of a light garment (the dhott) the smoking of a close (the chutta) with the lightest and to the secang or a near garment the mostly the amount of a cigar (the chutte) with the lighted end in the or a cear time courts, with the updates that in the mouth, and the depositing of tobacco and lime (khain) behind the lower ip of the mouth. A history of the mouth of the lower in the mouth of the mouth of the lower in the mouth. (Enamy) beams the lower up or the mount. A minor of the lesions which precede the de logical study of the designs which precede one of these capeers reveals a simiherity of appearance between them and the precurcerous stages in mice which have been painted cerous stages in times which have been capetimentally with Carcinogenic substances

The observations reported and a review of the available experimental literature on the subject of changes in the akin as a result of exposure to mechanical and a subject of changes in the skin as a result of exposure to mechanical and a subject of changes in the skin as a result of exposure to mechanical and a subject of changes in the subject of c changes in the skin as a result of exposure to merci-sariest and thermal irritants lead to the conclusion. ances and thermal infinite least to the concursion that in the induction of the tumors described the tast in the induction of the tumors described the part prayed by the reaction of the tunnes when are the earl of the cancer is equal in importance to that allowed by the carringments substances themselves the seat or the cancer is equal in importance to that played by the carcinogenic substances themselves

Saphir O. Appel, M. and Levinthal, D. H. Art fond Primes by Machanical Training In the Casers tempts to Localine Tumor Metastases in the Long Bones by Mechanical Trauma. Cancer for 1945, 5 722.

This experimental study was undertaken in order In superimental study was undertaken in order to ascertain whether of not traums applied to the constraints who involves to a desired to the constraints to the involves of the constraints of the involves of the constraints. to sacertain whether or not trauma appure to the long bones might be influential in the localization of long bones might be influential in the localization of The Brown Peace rable and malignant tumor malignant and readily transplantable into the tester, was used throughout the attroy Attenuate were mangant and readily transportance into the claims was used throughout the analy Attempts were made to localize metastates in the long bone by a claim of the control of the made to sociate mensions in the long coner by a single mechanical traums and by chronic utriation.

Bone metastases have not been observed in the stock of the st Done metastated have not been observed in the stock rabbits except in the spiral column, and then but the stock rabbits are the stock rabbits and the stock rabbits are the stock rabbits. native in the spine committee of the following and then but a first in the spine of the following and the following and the spine of th Rown peace carcinous grows in long bones transplants were made directly into the femurin 6 normal putte were made uncerty into the senior in outside rabble. The timor grew rell within the interest was spaced in all, soon invaded the periorities and made are periorities and made are accounted by the control of the TOW SPACES IN all, SOON INVAGEN THE PERSONNELLE AND INVASION THE PERSONNEL

Taums to the bones was produced by sample fracture of the humens. In a series of 21 rabbits Hactup of the numerous in 2 series of 21 republished left, humerous vas fractured and immediately. the lest numerus was tractured and improvisively afterward an intravenous injection of a superior of the same of autorward and intervenions injection of a suspension of tumor cells was made into the ear yet. In a of clunor cells was made into the ear vein. In a second series of 1s rabbits the humerus was fractured second series of 12 factors the numeror was fractioned and 24 days later a similar injection was made. In a second series of the second and 14 days later a summer injection was made. In a third series of 12 animals, the fumor was made. In a relative of 12 animals, the fumor was later at 12 animals. third series of 12 animas, the times was iron-planted into the testes. Two weeks later was iron-continuous accompanies to after the planted into the cates we were later that the cates we show that the cates we cannot be a casely paintable, the humans we show an a characteristic mechanical testicular tumor was cashy paipane, the numeric was fractured. In 3 other series thronic mechanical was incurred in 3 other series caronic mechanical infliction was produced by implanting a small, comparing of the form immediately beneath the rough piece of vitalium immediately beneath the periodicum of the femur beneath the quadrices accept movement of the life the most mixed accions the bone. Six works later the tendon so that with each movement or the fee the metal rubbed against the bone. Six weeks late the metal rubbed against the cone. Out weeks safer the intravenous of intracticular transplantation of the cone. Only thousand animals also distributed the cone. intravenous or intraceuteurs transpantation of the more was done. Only those atlined that died of mor was done. Only those amounts that externive famor metastases were considered MEMBER HUMOF INCLUSIONS WERE CONSIDERED AND ADMINISTRATION AND ADMINISTRATION OF THE PROPERTY Koenteenograms and autopsy studies of the stored no evidence of tumor cells at

fracture sites or sites of mechanical irritation in any Include sites of sites of mecanical inflation in any of the azimals. It is concluded that mechanical of the animate At is concluded that mechanical traums or chronic irritation of the bones played no traums or enume untarious or too source purpose mole in the localization of metastates from transplanted Brown-Pearce carcinoms in rabbits. JOHN L. LINDQUIST M.D.

Keller, A. D., Lawrence, W. E., and Blair C. B.;
Effects of Varying Degrees of Hypophysectomy
on the Dog. Arcs. Pasts, Chic, 1945, 40 189,

Varying degrees of hypophyrectomy were under Varying degrees of hypophysectomy were under several modes, and the animals were maintained for latter stages of their the openion. During the carbohydrate metabolism was assaud on a carbohydrate metabolism was assaud on a carbon. fatter rates of their survivat, the status of their carbohydrate metabolism was assayed on a quantitative basis.

ELVE OBELE.

SCENEI REPOSSION, CONSISTENCY OF STORY AND AND ADDRESS OF STORY ADDRESS OF STOR Screen regression, consultor or grown and a could be reliably associated with the removal of the Duting the tempty associated with the removal of the factors per as. The lowering of the carbon business are also carried to the carbon carbon and the carbon carbo pan antenor per se inc lowering of the carbo-hydrate reserves the occurrence and magnitude of nyarace reserves the occurrence and magnitude of the Housay effect and a decrease in address functhe Housiay effect and a decrease in adrenal lunc tion and size were associated with the progressive with the progressive and a size of the progressive archives are progressive archive archives are progressive arc tion and size were associated with the progressive concreachment on the hypophysial stalk ic subsequent to total removal of the part anterior and the manufacture of the part and the concreasion of the part and the par acquait to total removal of the part anterior and the position lobe. The greater the encruachment on the state of the stat Francisco como de gracio de cucroacument on inc sample, the firster were those deficits. These facts Figure 100 greater were times countrie. Ances rates also holdscales that the para titherally forces and the para titherally forces and the para titlerally forces and the para titlerally forces and the para titlerally forces and the parameter of decay to murate that the part timerain normally in common with the part of the exposited (presumably in common with the pair statement of the authority which are executed for the maintenance of these functions

Minicipance of these functions
There was essentially no accumulation of fat in
the control of th the livers of saturals showing a nearly material of saturals showing a nearly material of houses with the common of the common saturals and the common saturals and the common saturals are common saturals and the common saturals are common saturals and common saturals are common saturals. the livets of animals showing a nearly maximal (1) hypophysectomy per se (2) leafont retrieved concerning the hypothalamus (3) hypophysectomy piece on the stalk plus encroachment on the hypothalamus and (4) section of the stalk plus encroachment on the hypothalamus. creacinent on the appointments and (4) occurs to the stall plus enconchants on the hypothelanus.

Associate which followed broadle and models.

the state puts encounters on the approximations of the obesity which followed hypothelamic involvements was been that following and that following the occupy when toucomed hypothesismic involves the definitely pathological, and that following the ment was nonunciny particlessively and one communication was not one hypophysectomy per se was also believed to have a connected when the surgical procedure was limited to exclude of or selective innoval of the hypo-niversal staff. Physial stalk

open state.
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The term a hypothyral primedie.

not be test indicatively the contrary of the contrary to describe the type appoply therefore should ung work

functional results. In the anatomic examination the nunctional results. In the anatomic examination the amount of same attention should be founded on the amount of same attention about to located on the amount of the parameter remaining as on the remained of the parameter attention at the parameter of the

EXPERIMENTAL SURGERY Kinney, T. D., Harnes, F. W. and Dester L., Emperimental Production of Putmonsary J. Lab bollim by the Use of a Vennus Catheter J. Lab enterior

To evaluate various methods of therapy for severe to crause versus memous or memby for severe the thermal burns in rat, the authors have devised a thermal burns in procedure. This has made it possible and the procedure of the standard burn procedure. This has made it possible (i) to obtain reproducible survival rates (3) to (t) to obtain reproducing survival rates (3) to eliminate the preserve uninjured extremities (3) to eliminate the

preserve ununjured extremities (3) to cumunite from the complexition of frauna and hemorrham from the complexition of frauna and hemorrham from the complexities and 1 A to a few terms the complication of training and hemorrhage from and (a) to preserve uninjured body andingention and (a) to preserve uninjured body accidence and permit the roiding of urine and defects of the continuous and defects

The success of the method is dependent on the the success of the animal is represented to the possible conditions. standardization of all possible conditions. The Wistor rat was used as the test animal and kept WHERE THE WAS UNCO AS INS INSTANTIAN AND REP.

WHERE THE WAS UNCO AS INS INSTANTIAN AND ADMINISTRATION OF THE PROPERTY OF THE

useer consumers of controlled temperature humble lity and diet. The food and water intake after the burn had been given was also controlled. im nad been given was any uninsum.

A scald burn of the back was produced on the anoshbetted rats by immersion for 15 sections as OCL 015°C A series of burns was produced 90 CL 015°C A series of the tase of the tall. po C± 0.15°C. A series of burns was produced in the base of the skill to the base of the skill t

from the base of the settle to the base of the tail, which the lateral and ventral burned area varied by the base of the base with the sacret and ventral correct are varied by arching of the back. The burned kin was sharply arching of the back. The purpos skin was snapsy, demarkated and removed in order to calculate the nemarcated and removed in order to calculate the percentage of total body surface burned. By varying the control of the calculate of the calcu the curvature of the pack ou immerator the partied

area can be varied from 45 to 10 per practice it was found that within this superal sired Percentage of surface burn could be opened

In order to obtain reproducible served a CENTRAL OL BIN START DELEGATES OF PRINCES within ± 2 per cent.

tend the luited seights of the principal ansatz within a closely selected weight hand. Trampanga pang padu aingied extempleth (1) pana merung a rangela acidical acidir many 1800. 300 km sm (3) from 300 to 310 km mit. 100 gr. am (2) from 50 to \$10 feet and \$1 the tend from \$1 the troth body smites her cent or more of the total body small control of the total body small cont

cent or more of the total body united for while all rats receiving sensitivin 48 hours while all rats receiving sensitiving and the control of the control o Per cent or less of the total body suffer that per cent or sea of the local body miner than a start of the from preciving a ten and the start of the from the JA Her erns or their total body innect terms consistent survival percentage for the car-

consistent survivas percentage na camera establi groups of ea per cent.

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Reproducible survival rates defend as there reproducible survival rates defend to the of all possible factors, such as the temperature of all possible factors, such as the temperature of the seems to be the firm of the temperature. survival.

or all possible factors, such as the impossible to be stored to be the bath time in the bath, wrights of the cost fastly account for when cost fastly account for when cost pain time in the bath, weights of the areast in finally erasonal variations for mixes conf. I they cannot a state common time and a state conf. notes; seasonal variations for the complete they cause & statistically affailed the complete they cause of the second of the sec uny case & statistically significant missions of the case of the scalibility of the mission is case of the scalibility of the mission is cased on the scalibility of the case any one of several variable isolors it is recovered that a final taneous controls always account that a final taneous Experimental groups.

## SURGERY

## GYNECOLOGY AND OBSTETRICS UNE 82

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# OBSERVATIONS ON RADICAL SURGERY FOR LESIONS

## ALLEN O WHIPPLE, M.D., F.A.C.S., New York, New York

T is now ten years since an effort (28) was begun to revive previous sporadic at tempts at operating on malignant tu mors involving the ampullar area and the pancreas Since then considerable progress has been made in the evolution of the surgery of this region and organ. It is the purpose of this paper to discuss the factors that have made possible this progress and to call atten tion to mistakes to be avoided and to certain safety factors that have been found to insure a satisfactory result in the several procedures that can be used as indicated by the present ing pathology The diagnosis of these lesions is not discussed in this paper

The phase of surgery of the pancreas deal ing with the removal of islet cell tumors for hypermsulmism-a most interesting chapter in itself—had a determining influence in developing the radical surgery for malignant tumors For it was demonstrated that with the use of silk for ligature and suture material with the delicate handling of tissue that such technique requires it was possible to carry out safely and with little reaction limited or ex tensive excision of pancreatic tissue the pre-cristing dread of the pancreas as a not me tangere was removed and the confi dence of surgeons was increased in attacking

From the Department of Surgury Columbia University New ork.

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The history of previous efforts to deal radically with the tumors involving the duodenum the common duct and the pancreas 18 worth reviewing because it emphasizes the grave dangers and the serious complications which deterred surgeons in the past from con tinuing attempts to deal with these lesions It must be remembered that these surgeons dd not Lnow of the advantages of vitamin K blood transfusion and other shock prevention therapy and did not appreciate the signifi cance of the principles of silk technique. HISTORICAL REVIEW

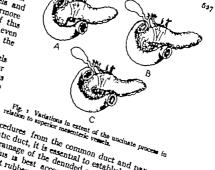
The first successful attempt to remove an ampullar growth with excision of a segment of duodenum and a portion of the pancreas around the ampulla with implantation of the pancreatic and common duct in the line of suture of the repair of the duodenal defect was accomplished by William S Halsted in 1899 His patient developed a stenosis of the common duct after 3 months was reoperated upon a choledochostomy being performed but died 6 months later Autopsy revealed recurrent carcinoma in the head of the pan

Mayo Robson in 1900 and Koerte in 1904 removed cylindrical segments of the duodenum including an ampullar carcinoma but the patients did not survive the procedure In 1907 Desjardins described an operation for

WHIPPLE RADICAL SURGERY FOR LESIONS OF PANCREAS head which is described in the anatois the lingula or unconstant in the analysis of the process of the a the targua of authors process of the pancress This may be absent or be so developed as to enarcle com the superior meantern continue tour the portal vem (Fig. 1) Fredom and from the standard and standard standard

ficult to determine the size of this and its relation to those vessels even Jae diodenium with the head of the s has been mobilized. the superior mesenteric vessels

S the Superior decorate of the ferminal por be duodenum, can be shown to pass the head of the pancress with no de traue behind of surrounding them loging of the neck of the pancreas done from in front and with great old injury to the superior mesenters. al, and the terminal splenic vessels



Bgula or uncomate process is present again of animate process to present to from the concavity of the lingula cedures from the common duct and pance is true the concavity of the inguing desiry. This approach also facilities and submission of the pancreaticoduction of the ate duct, it is essential to establish adequate AUC MUCE, IL IS CASCILIA, IN CALCULAR ACCORDING TO THE CANADA IN CANADA IN CALCULAR ACCORDING TO THE CANADA IN CALCULAR ACCORDING TO THE CANADA IN CALCULAR ACCORDING TO THE CANADA IN CANADA INCONDINA IN CANADA IN CANADA IN CANADA INCONDINA IN CANADA IN CANAD sels and tributaries from the pan drainage of the denided tetrodicolonia area and a sub-base sub-base sub-base sub-base sub-based by a good sized and a sub-based by a good sized by a good size he portal bed and the trube with side openings contain a small part with side openings contain a small part of the side openings contain a state of the side openings contain a small part of the side openings of t Eards the resections of the pancreas cation and chronic inflammation

Soft Funder fund With Side Openings Contain and for a simple fully tube to which continuous transform as he ameliand The contains with with the form controllable pain the decraion as to ag a summer funder tude to which continuous several lateral manning. The outer tube with suction can be applied the outer time who attaching tracif to advant timbes. of the organ 18 to be removed 18 several lateral openings prevents the suction attaching their to adjacent tissues I by the pathology as about by tion attaching itself to adjacent tissues of any armids, or account the chiptying that captying that captying account the captying and constant captying account the captying account the captying account the captying account to the captying accoun Tams for calculation and by the and insures prompt and constant emptyme would collect in the subherpatic space or This has two otherwise or This has two otherwise or This has two otherwise or This has two others or The transfer of the tra ology found at operation a and industrion are innited to tail Would Collect in the supplement space of the supplement of the supplementation of the suppl the head of the organ with the duo Morrison a Pouca.

Vaniages it prevents the scaling of the

and that may have unitating Y be left intact. If the Pathology is the lead a pancreaticoduoderec If the and digestive action on the patient's akin it may have arrising to measure the law of and it dicated with the same one stage attacked with the same of the

and discrive action on the patient's attn it and also tribles which in some ones of fluid makes it possible to measure the loss of fluid and electrolyte which in some cases may be reasoned to the loss of fluid and the the pathology involves all parts of and electrolyte water in some cases may be a first week of the post as a fold pancratectomy with a count pancreatectomy with operative penod The will result in a dispetes

Measures to determine and to treat the seasons of t smaller doses of meulin of diabetes mellitus. A cardiovascular renal, and nepatic dystunce of the month o total pancrentectomics tion are easential in all radical pancreaus surface of automotion many of these patients, gery The fauncie in many of these patients, and beautiful many of these patients, among and in the patients, among and in the older te by several surgeons If Of Several Weeks QUITATION THEY SECTIONAL MAY SECTIONAL AND ASSESSMENT OF THE PROPERTY OF T of months to warrant renat and depatic damage and in the older names of Flactross relicorantic striction may be er of leakage, during these radical pro-

Patients invocardial impairment is frequently present. Electrocardiographic studies in electron as the state of the studies in Prolonged prothromby and clot

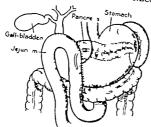


Fig. 2. Antecoli anastomoses ith loop of jejumma.

ting time demand intensive vitamin K medi cation preferably by clysis. Failure of the prothrombin time to return to normal is an indication of severe liver damage and adds materially to the danger of the immediate postoperative period. It is advisable to give 25 000 units of penicillin every 4 hours for 24 to 36 hours before operation to combat gram positive bacterial infection in the operative Preoperative transfusion of blood is usually indicated A Levin or Wangensteen tube should be placed in the stomach before operation to be used for suction after the ope ANESTHESIA

The choice of anesthesia is largely deter mined by the preoperative study. An ex perienced and skillful anesthetist is essential and he should be consulted as to the choice of anesthetic in the individual case. In our ex perience gas oxygen ether general or contin uous spinal has given the most satisfactory and safe anesthesia. The radical operations are 4 hour procedures and require administra tion of anesthesia by skilled technicians well as administration of supportive i form of continuous u

saline inf meters of the latte

The illuthree types

to 1500 cubic cent ood transfusion Detation

QUES

2 3 4) showing lical procedure

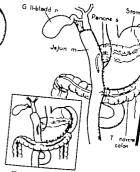


Fig. 3. Antecohe or postcolic anastomoses sin lumb of resected Jefumann.

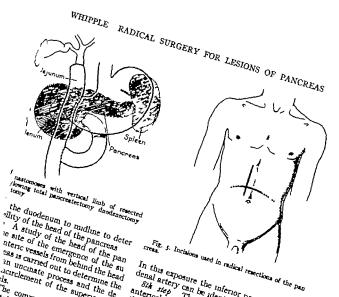
dicate the steps and stages of the op Certain points in the anatomy and to will be discussed in more detail.

Incisions The incisions (Fig 5) upon the procedure indicated For the tion of the duodenum and head of th creas a right rectus incision from costs to the umbilicus gives adequate expoavoids the contamination of a long tr incision For resections of the entire; or body and tail, or for exploring the for islet cell tumors the curved trans casion above the umbilicus through b and into the oblique muscles is essent forectus incision is mentioned only as inadequate and handscapen



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A study of the head of the pan e site of the emergence of the su ntenc vessels from behind the head

and is carried out to determine the in unconate process and the de an uncurate process and the uc-periodic of the superior me The common duct is separated

portal velo in the gastrolepatic F hepatoduodenal ligament well vatic duct and behind the ducwere it is to be divided between The stomach is divided proximal

Its between Payr clamps The gastroduodenal artery is r identification of the hepatic art -Thich it arises Depending upon the location and uncuate process the diodenum is

ximal or distal to the diodenotion proximal if a carcinoma of ton prosent distal if a carcinoma or of the pancreas is present or if the cas passes behind the superior asels Great care must be used te duodenojejunal Punction to to the mesenteric root vessels

In this exposure the interior pancreaticodus. the this exposure the interior pancreaticoduodenal actory can be identified and ligated.

The pancreas is now divided
antimorphy as the interior pancreaticoduoantimorphy as the pancreas is now divided. antenorly at the Pancreas is now divided the minimum vocasile and month from divided and body attendity at the function of near and body the spiente vessels and portal vein identified the spienic vessels and portal vein identified the portal vein and superior mescaterial away from sha have a spienish spieni and the portal von and superior measurement of the management of t Vessels carefully dissected away from the nead of the pancress. This is especially important the nead and increases are the the increases are the the increases. of the Paristens this is especially important the unconstended process endredge the superior The based of the superior If the unconate process envirous the superior research to vessels. The head of the pencies and discharge and discharge and discharge. mesentenc vessels

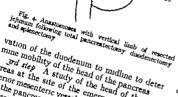
Pylorus end of common duct, and duodenum

To the discontinum duct, and duodenum Pylorus end of common duct, and duodenum as removed en masse. If the duodenum is are removed on maste at the discovering a divided proximal to the discovering and should be checked most and should be checked to check a should be checked to check a should be checked as the checked most and should be checked to checked the checked and should be checked as the che arraced proximal to the anogenojejunal func-tion the distal cut end should be closed with tion the distal cut one should be closed with a state of the chronic continues of the chronic co an over and over such or one curonic could and this closure buried with uous suture and this coome oursed with interrupted mattress scroserous sutures of the same interrupted mattress seroscrous surfaces of the joinnum is divided in the polynomia in the properties of the polynomia in the properties of the properties o Interrupted Sur 4 the Jejunum is unviocation the duodenojejunal Junction the survival and survival the survival to the surviva distal to the duodenojejunas junction the distal cut end is used as the anastomotic limb and is known to known

and is best brought up through the rent in the and is best problem up through the rent in the mesocolon to be used for the necessary anasto. mesocolon to be used for the necessary anastonotices. If the duodential has been closed

notices have a hour of behinnin can ha head antemoses. If the duodenum has been closed and the duodenum has been c etther & loop of Jejunum can be used ante Coucasty for the anastomoscs or a vertical limit can be homoth in bahind on the mesocolon of the fermion divided below the mesocolon conformation for the answermance to the filling of the can be prought up benned or in front of the anastomoses to be followed by an anastomoses to be followed by an end to side Roux Jejunojejunostomy

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mine mobility of the head of the pancreas A study of the head of the pan-For step A study of the dead of the Path penor mesenteric vessels from behind the head Performesentiere yesseta trota ventua une meat of the pancreas is carried out to determine the or the patients is carried but to determine the presence of an uncharge process and the de-Erce of its encirclement of the superior me senteric vessels

from the portal ven in the gastronepatic The common duct is separated itom the Portal vem in the Rastronepatic contentium or hepatoduodenal ligament, well had not the discontinuous the disco onenum or reputoduotenu ngament, wendoming where the cyatic duct and behind the ducdenum, where it is to be divided between 5th step The stomach is divided proximal to the pylorus between Payr clamps

to the pylorus between rayr clamps

ligated after identification of the hepatic art cry from which it anses 744 step Depending upon the location and extent of the tumor and the presence or ab-

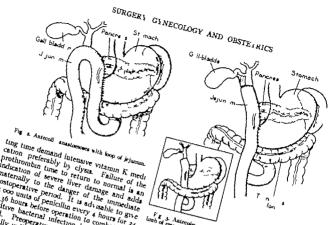
extent of the tumor and the presence or ab-sence of an uncunate process the duodenum is divided process the duodenum is sence of an uncluste process the duodenum is divided proximal or distal to the duodence QUICE PROXIMAL OF QUELLE TO THE QUOCHENGE OF THE PROXIMAL OF THE CAPTION OF THE PROXIMAL OF THE CAPTION OF THE PROXIMAL OF T Jefunat Junction Proximat it a carcinoma of the ampulla is present distal if a carcinoma of the beard of the proximation of the the ampute is present curves it a curculative of the head of the panceas is present or if the included process passes behind the superior research constraint and the superior research constraint care than to be trained to the superior constraint care than to be trained to the superior care than the superior care that the incurate process passes behind the superior than the discharge must be used freeing the duodenoie junal junction to vid damage to the mesentene root vessels

Fig. 5. Includes used in radical resections of the pan In this exposure the interior pancreaticodus.

denal artery can be identified and ligated ienal artery can be identified and figated 8th stop. The pancreas is now divided and hadron of head and hadr. antenorly at the Junction of head and body attenory at the Junction of Bead and Dody the splenc vessels and portal vein identified, and the portal ven and superior meanined, wessels carefully dissected away from the head versels carefully dissected away from the dead of the patterns. This is especially important in the manner and the state of the patterns and the patterns are t of the pancreas. And is especially important the unchate process encircles the superior If the unchase process encircles the superior pylorus end of common duct and duodenum pysorus ena os common auer ana auoacaum asse removed en masse H the duodenum is are removed on masse it the quodenum is the shadard proximal to the duodenojejunal june shadard cut and shadard has shadard to the duodenojejunal june shadard to the shada

avided proximat to the autorenoising func-tion the distal cut end should be closed with an over and over silk or fine chronic content with the chronic content un over and over suk or me caronic contain the closure buried with uous suture and this cosure nuricu with seroscrous sutures of the seroscrous sutures and the seroscrous sutures and the seroscrous sutures are seroscrous sutures are seroscrous sutures and the seroscrous sutures are seroscrous sutures are seroscrous sutures are seroscrous sutures and seroscrous sutures are sero interrupted mattress senserous sutures of the strain for the sinchlands interrupted sill. If the Jefunum is divided that the strain strain the strain strain the interrupted sus. If the legitimen is divided to the duodenojejunal function the analysis are the anestermost first. distal to the unoucoujejuna junction the distal cut end is used as the anastomotic limb and is best brought up through the rent in the and is pear orought up through the feat in the mesocolon to be used for the necessity anasto-

mesocoion to be used for the necessary anastomoses. If the discontinuas seem conservations the state of a variable to the discontinuation of the discontinuatio citner a 100p of Jejunum can be used antecolically for the anastomoses or a vertical lumb Coucatry for the anaxonroses of a vertical modern to the fellowing divided below the mesocolon can be brought up behind or in front of the can be problem up beams or in front of the anastomoses to be followed by an The end to side Roux Jejunojejunostomy



F. g. 3. Anticodes or postcodes anastomores with verifical

prothrombin time to return to normal is an protupmous une us return to normal as an indication of severe liver damage and adds materially to the danger of the immediate maternary to the danger of the immediate postoperative period. It is advisable to give postoperative period. It is an issue in sive 3.5 coo units of periodiin every 4 hours for 24 25 000 units on pentitum every 4 mons for a to 36 hours before operation to combat gram to 30 mours occure operation to common Season meeting in the operative Properties transfusion of blood is maily indicated A Levin or Wangemeen table should be placed in the stomach before

operation to be used for suction after the ope ration.

The choice of anesthesia is largely deter mined by the preparative study mines by the presperative away on expercentary and samula accountant to cascing and he should be consulted as to the choice of and oe should be consumed as to the cuote of endividual case. In our exmore council has continued the first out of continued the continued that the continued th tenence gas onlygen cuter staterat or continuous spinal has given the most satisfactory and said anesthern. The radical operations and a four procedures and require administration of the state of the s are a now procedures and require administration of anesthesis by skilled technicians as rell as administration of supportive intra ren as administration of supposition man property and the form of continuous drip. tenous muos in the form of continuous origination and 500 to 1500 cubic centisame unusion and so to isso come cents meters of matched blood transfusion during the latter part of the operation.

OPERATIVE TECHNIQUES The illustrations (Figs. 2.3.4) showing the three types of one stage radical procedures in

dicate the steps and stages of the operations Certain points in the diatomy and technique will be ducussed in more detail

The incusors of the incusors of the incusors (Fig. 5) depend upon the procedure indicated. For the resec upon the procedure variance. and the reaction of the duodenum and head of the pancores a right foctus incusion from costal margin to the unbilicus gives adequate exposure and to the unfolled gives also useful expendite and a long transferse avoisi the contamination to a long transverse incident. For resections of the entire paneras or body and tail or for exploring the pancreas or body and tail or for capturing the particles for ulet cell tumors the curved transverse in to met cen tamors the curves analysis and control of the tambilism through both rect and into the oblique muscles is exential. The and more consider massers is essential the left feeths included is mentioned only to condemn it as insidequate and handleapping

TECHNIQUE OF THE ONE STAGE PROCEDURE POR CARCINOMA OF THE AMPULLIR RECION Right rectus incusion is made from near engiorm to below umbilicus. rat review of the bead of the

pancreas, daodenum review or the team or the pand liver is carried out to determine presence of metastascs. metastases, and the Incision of the pertoneum is

made to the right of the duodenum with ele

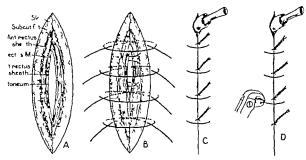


Fig. 6. Illustrations of repai of the mession and dramage tube to be used

iwings (Figs. 2 and 3) illustrate these modiations.
ofk step End to-side gastrojejunostomy is rformed.

oth step. The dilated pancreatic duct is apoximated into the jejunum above the gas jejunostomy a goiter or Carrel rubber tube ing used to connect the pancreatic duct with unal mucosa through a 5 millimeter opening the wall of the jejunum. The rest of the ump of the pancreas is to be tacked to the junal wall with interrupted silk sutures irs. 2 and 1)

IIIk step End to-end or end to-side ioledochojejunostomy is performed depend g upon the use of a loop or a limb of reinum. A posterior layer of fine silk is used r seroscrous suture followed by an over-and ver continuous fine chromic suture to unite se mucosae and walls of the duct and jeju um, followed by the anterior seroserous sture. If there is any tension whatsoever on ils anastomosis the gall bladder or the hepa duodenal ligament should be tacked with iterrupted silk sutures to the jejunal loop or mb to relieve tension. If a limb has been rought up behind the colon the rent in the resocolon should be tacked to the vertical mb of jejunum to close the opening and revent herniation. If a loop has been used for the anastomoses the distal portion should be used for the gastrojejunostomy so as to avoid gastric contents from flowing over the common duct and pancreatic duct anastomoses.

rath step Peritoneal toilet sponge and pad count are made and a careful review of the hemostasis.

13th step The perforated rubber tube with inner suction tube is placed in the subhepatic area away from the anastomoses to collect scenare and leakare of bile etc.

ith ites. Near and far steel were sutures through all layers of the abdominal wall with interrupted fine silk mattress sutures for peri toneum and posterior rectus sheath are placed and tied before the steel wire sutures are tied or twisted to approximate the edges of the incision (Tig 6B). The wire sutures should be left in place for 12 to 14 days. The long segment of each wire suture should be cut at each end near the skin. (Fig 6D). The next day the twisted wire can be removed easily.

It should be emphasized that a slow trans fusion should be started as soon as the patient is found operable and continued during the procedure using if necessary 1000 to 1500 cubic centimeters of blood. It is a long trying operation and depending upon the build of the patient and the presence of fat in the upper

abdomen and mesenteries the time of the pro cedure will vary from 31/2 to 5 hours.

- REFERENCES
- I BRUNECHWIO A. Surg Gyn Obst., 1057 65 661-665 3 ICu. The Surgery of Pancreatic Tumora. St. Louis C. V. Mesby Co., 1943
- J COTETT R. Ann. Surg 1992 So 1238-1264 COLE, W. H., and RETHOLDS, J T. Surgery 1945 18

- 4. COLE, W. LL, and KATHOLDE, J. 1. Surgery 1945 16.
  5. COOPER, W. Ann. Surg., 1947 106 1009-1035
  6. DESTABLING, A. Rev C., Part 1007 135 945-973
  T., and Olisse, C. S. Am. J. Physiol., 1918, 46
- & HALERED W S. Boston M & S J 1899, 141 645-
- 9. HIERCHE, G Münch, med, Wachr 1914, 61 1748-10. HUNT V Ann Surg 1941 114 570-601
- 17 MATU-MURAUM A. MEL MILLERINA COME AND TO SERVICE OF THE METERS OF THE
- 24. WHIPTER, A. U. Am. J. Surg. 1030, 1 200-20, 20. Idem. Am., Surg. 1041 114 012-015 20. Idem. N. England J. M., 1042, 220 513-526 70. Idem. N. E.Brand J. Sil., 1942, 220 513-520 37. Idem. Ann. Surg. 1945 121 647-853 38. WHITTLE, A. O. PARBONR, W. B. and MULLING, C. R. Ann. Surg., 1915, 103 763-770.

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### PRIMARY SUTURE OF NERVES

R. B ZACHAR'S F.R.C.S and W HOLMES, M.A. D.Phil. Oxford, England

HE distinction between a primary and a secondary nerve suture is fairly generally understood, but the precise definition of the terms prents some difficulties. If a time limit is used the criterion for example, suture within 12 or 48 hours, some cases would be wrongly luded from the group of primary sutures though the nerve repair were undertaken the time of the first surgical treatment of wound. In peace time this operation is lly done within a few hours but during the wound excision may not be done for 3 or more days when the direct local ef its of the trauma are still in evidence and re has been no tissue repair. It is clear the environment of a sutured nerve at h a stage is more closely allied to that

h prevails in the immediate posttrau
to period than to the conditions obtaining
the wound has healed and a nerve
to performed in such circumstances
uld still be a primary nerve suture. For the

oses of this paper we define primary suture as the repair of a nerve through original unhealed wound at the time of the rative treatment of the wound itself

ine earliest record of nerve suture is of a ry repair of the median and ulmacattempted by Baudens in 1836 (L&ticnt 1873) Contact of the suture material the nerve was avoided to prevent sams and approximation of the nerve a was accomplished by suturing the

jacent tissues. Unfortunately the patient

1 8 days later and the nerve ends were d to have separated.

I nere is no evidence that the operation was 'ed until nearly 30 years later then in '2 more sutures were reported the first | by Nélaton (Houel, 1864) the by Lauger (1864) Both were print y sutures and in each case it was claimed

Bobnes is Belt Memorial Fellow rom the Department of Orthopastic Surgery (Peripheral ree I jury Centre) and the Department of Zoology and mparative Assistomy University of Oxford. that motor and sensory recovery followed within a few days of operation. Howell and Huber (1893) collected records of 84 primary sutures they concluded that after primary suture the prognosis is favorable. Function will probably be restored completely or They also added that after partially secondary suture the prognosis is good im provement is almost certain and in a large proportion of cases complete success may be expected In comparing the results of primary and secondary suture they were con cerned mainly with the problem of first intention healing of nerves. The view has been remarkably persistent that primary repair of nerves leads to healing by first in tention and early clinical recovery at a rate incompatible with degeneration and regenera tion of the distal trunk, and as late as 1023 at the International Congress of Surgery in London Henrikson reported such a case. But there is no doubt that in all examples of apparently immediate recovery many of which have come under our observation the sensory 'recovery is due to overlap from adjacent nerves and the motor recovery' to anomalous innervation or trick movements the hypothesis of first intention healing is now

emloded. Another review of a senses of primary sutures was that made by Sherren (1908) who examined to cases. Recovery of pain sensibility started between the 5th and 25th week, and touch sensibility between the 19th and 46th week the longer delay was in some cases ascribed to suppuration. He stated that restoration of tactile localization was not as a rule complete until more than 2 years after suture sometimes longer and that all cases uncomplicated by suppuration reguned per fect sensibility He found that motor power returned in about I year after si of the ars ulnar nerve at the wrist and not following suture at the elbow ! Ĭn, specify the quality of reviewing the older cases of

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performed at the London Hospital he found only one in which there had been no recovery a patient whose wound became infected Sherren advocated primary suture of divided nerves because the prognosis after secondary suture is more unfavorable

Platt and Bristow (1923) in reviewing the late results of nerve injuries of the war of 1914 1918 refer to the extreme perfection attained after so called primary sutures and the incomplete type of recovery which is the rule in the majority of secondary sutures They ascribe the difference to the type of lesion—the nerve was more seriously damaged in gunshot wounds and these all came into the class of secondary sutures

Gonzalez Aguilar (1928) advocated suture as soon as possible after the myelin remains had been removed from the distar stump at the time when Schwann cells exhibited their maximum activity the optimum time for suture in his opinion is about 30 days after division of the nerve

Herbig (1937) reported a primary inerve sutures; 2 were followed by complete re covery 1 by improvement and there was 1 failure In a series of 13 secondary sutures performed 2 to 12 months after injury, 5 were cured and 8 improved there were no failures His conclusion that primary suture gives the best results does not seem reasonable from

Platt (1937) refers to a series of 12 primary sutures Although he does not give the results in detail he concludes that in primary sutures performed under ideal conditions complete recovery of motor power and re covery of protopathic sensibility at least is to be expected In secondary autures partial or complete motor recovery with imperfect restoration of sensation has been the rule He advocates primary suture in small rel atively clean wounds. In more extensive wounds with widespread bruising and mul tiple tendon injuries and in wounds in which infection has already secured a hold partial or Complete failure after primary suture is almost mevitable

Many other authors (Pollock and Davis 1933 Gallie 1942) hold similar views but Mitchiner (1939) advises primary nerve

suture in gunshot wounds even in the presence of moderate infection

During the Spanish Civil War Jolly (1942) carried out a number of primary nerve sutures but gave up this practice on the advice of Diaz who had found that the results of secondary nerve suture were better

From the accounts of these authors it would appear that the chief factor militating against the success of a primary suture is infection and although many would hesitate to undertake primary nerve repair when in fection is probable few would controvert the statement of Pollock and Davis that if pri mary nerve suture is performed and the wound remains clean and heals by primary intention we have taken advantage of the best possible conditions under which end toend suture may be performed

The investigation of nerve suture by animal experiments performed under aseptic conditions has shown that an optimal func tional result is given by primary suture and that delay in repair progressively prejudices the quality of recovery However the only primary sutures in man comparable with those carried out experimentally are those performed when a nerve is divided either accidentally or deliberately during the course of an operation The conditions prevailing when suture is performed immediately after an incised lacerated or gunshot wound are different in many ways from those prevailing in an experimental or accidental operative section and the following analysis of the re sults of primary repair performed under a variety of conditions has been undertaken with a view to determining the policy to be adopted in the early treatment of divided

## MATERIAL AND METHOD OF INVESTIGATION

Material In this series are included all the cases of primary nerve suture which have come under observation at the Penpheral Nerve Injury Centre at the Wingfield Morris Hospital Oxford during the years 1940-1944 We have excluded all those in which the surgeon arned at nothing more than a rough approximation of the stumps at the primary operation There were 55 primary nerve

TABLE I -PRIMARY NERVE SUTURES

TABLE I -PRIMARY NERVE SUTURIS								co
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ures in 49 patients. In 3 the nerve was liate suture was undertaken. Fourteen were sutured during the primary atment of gunshot wounds and 38 during repair of incised or lacerated wounds the ults in these cases demand special atten

pattern and quality of recovery after n (Table I) suture depend to a certain extent on the involved and for this reason lesions of vidual nerves will be considered separ ly before a final review is attempted.

r variable factor that must be allowed in the analysis is the site of the lesson covery after auture of the median or ulnar rve in the arm is nearly always less satisthan after suture in the forearm and e results in these two nerves are therefore separately for high and low sutures. in the early days of this work those pa whose nerves had been sutured at the imary operation were not subjected to oration unless there was some very reason for doing so such as the of any aign of recovery long after it due Thus the cases in this group have en under observation for a considerable

time-up to 4 years-ample time for recovery to reach a stage at which it could reasonably be compared with that observed after secondary suture More recently after it had been found that a number of primary nerve sutures had not been followed by satis factory recovery the policy was changed and on a number of occasions exploration was undertaken at an early date in 16 cases resection and resuture were performed. In some of the cases subjected to reoperation sufficient time had clapsed for recovery to be apparent and the quality of such recovery as had occurred will be indicated. In a certain number however exploration and resuture were undertaken before any clinical signs of regeneration could be expected and in these the data on which the assessments of the success, or Otherwise, of the primary suture are based are histological-not clinical

Clinical grading of recovery In 1942 the Medical Research Council adopted a scheme for the assessment of recovery in peripheral perve unjuries suggested by Highet (Highet and Irolmes, 1943) This system has a neurological basis, and motor and sensory recovery are considered separately scheme provides a valuable foundation it has been found necessary for our purposes to introduce certain intermediate grades in the assessment of ulnar median and radial palases. For example after a high leason of the median nerve the recovery of slight power in the long flexor muscles is described as grade MI yet another patient who shows con siderable strength in the long flexors but has not yet regained voluntary power in the thenar muscles comes into the same low category Similarly with the ulnar nerve a patient who has recovered only slight volun tary power in the hypothenar muscles is classified as grade 2 which is the grading for another patient who has regained voluntary power in all the intrinsic muscles though not sufficient to act against resistance. It is necessary to introduce intermediate grades for each nerve and the following system has been adopted in this paper. It is presented at length herein since others may find the classification of use in the accurate assessment of recovery

### ULNAR NERVI

M.o No contraction in any muscles My Return of voluntary power in the proximal iong flexor) muscles although they are not able to act against gravity

M 1+ The Proximal muscles act against gravity M 2 The proximal musics are acting and there is a contraction in the hypothenar muscles at least to a contraction in the hypothesia influence at least with either no action in the interesses or not more than a flicker

Ma+ The proximal muscles and the intrinsic muscles are all acting and the first dorsal interosmuscles are an acting and the mat mouses interessed secons muscle produces a definite movement but does not act against resistance

of act against remarkers

11.3 The long flexor muscles the hypothenars

and the first dorsal interosseous act against re 

Overnent to the largers in possible

M.4. Recovery to grade 4 but the independent movement is good although not perfect.

The subdivisions are the same as for the median The subdivisions are the same as not the medical nerve and will be dealt with under that heading

Mo No contraction in any muscles

M I A definite contraction in the proximal (long Date of muscles but they do not act against gravity AM, it The proumal muscles act against gravity ALT: The proximal muscles act against gravity but there is no return of power in the thenar muscles M 2 The proximal muscles act against gravity and there is a flicker in the thenar muscles

to there is a maker in the mental musers at 3 Ant tuctual muscles act against tensioned.

M.4 All muscles act against strong resistance and me independent action is possible. M 5 Full recovery in all muscles

## S.c. No recovery of tensibility in the autonomous zone of the median nerve

ne of the median nerve

S.I. Recovery of deep cutaneous pain sensibility 31 Accurety of deep cutaneous Paul schalding within the autonomous zone of the median nerve

tun the autonomous sone of the median nerve S. 1+ Recovery of superficial pain semibility "Secovery of superiories pain and some touch sensibility 5.2+ Recovery of superficial pain and touch

3 3 7 Recovery of superactar pain and courn sensibility throughout the median area but with S. J. Recovery of pain and touch sensibility with disappearance of over response

53+ Recovery as far as \$3 but localization of the stimulus is food and there is imperfect recovery of

## RADIAL MERVE

Mo No recovery Molor Recovery

Mr. Return of voluntary power in the proximal of t Actual or Voluntary power in the proximal muscles but not sufficient power to act against

M 1+ Return of power to the proximal muscles At 1-7 Keimin of power to the proximal muscles sufficient to act against gravity no return in the

M 2 Return of voluntary power in the proximal At 2 Return or voluntary power in the proximation muscles and the muscles acting on the thumb but the state of the state o muscles and the muscles acting on the musil but the latter are not able to act against resistance. M 3 Recovery to M s but abductor pollicis longus and extensor pollicus longus act against re sistance,

M.4. Proximal and distal muscles are acting strongly against resistance and some independent to vention of the impers is possible.

A.4. Independent movement very good but not Perfect. M 5 Complete recovery

Intermediate grades as for median nerve may be used.

Although both motor and sensory recovery will be indicated in the tables giving the results of primary suture it is clear that for the ulnar and radial nerves motor recovery is the more important and should be used as the chief criterion for comparison, whereas for the median nerve good sensory recovery is of chief importance

One further point must be made clear before presenting the results Previous au thors have been impressed by the poor quality of recovery after secondary nerve suture as compared with primary which is not sur prising if all secondary sutures are taken into account. Such a comparison is not of great value since it would include consideration of many nerve injuries for which primary suture would have been quite impossible for ex

ample those in which there was a large gap It would also include many cases in which there was an unnecessarily long delay for example in cases in which exploration had been postponed many months in the hope of recovery because at the primary operation the nerves were not seen to be divided and also in cases complicated by prolonged sepsis Such delay leads to profound changes in the nerve, the end-organs and muscles, changes which adversely affect the quality of re covery A better idea of the value of primary

suture is obtained by comparing the quality of recovery with that seen after early secondary repair of lesions in which the gap was not so

## SURGERY GYNECOLOGY AND OBSTETRICS

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tures in 49 patients. In 3 the nerve was cidentally divided at operation and imdiste suture was undertaken. Fourteen rves were sutured during the primary atment of gunshot wounds and 38 during e repair of incised or lacerated wounds the ults in these cases demand special atten-

The pattern and quality of recovery after rve suture depend to a certain extent on the rve involved and for this reason lesions of lvidual nerves will be considered separ ely before a final review is attempted. other variable factor that must be allowed r in the analysis is the site of the lesion covery after suture of the median or ulnar rve in the arm is nearly always less satis ctory than after suture in the forearm and e results in these two nerves are therefore ven separately for high and low sutures. In the early days of this work, those pa mts whose nerves had been sutured at the imary operation were not subjected to exploration unless there was some very vious reason for doing so such as the sence of any sign of recovery long after it as due Thus the cases in this group have en under observation for a considerable

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Medical Research Council adopted a scheme for the assessment of recovery in peripheral nerve injuries surgested by Highet (Highet and Hofmes, 1943) This system has a neurological basis and motor and sensory recovery scheme provides a valuable foundation it has are considered separately been found necessary for our purposes to introduce certain intermediate grades in the assessment of ulnar median and radial palsies. For example after a high lesion of the median nerve the recovery of slight power in the long flexor muscles is described as grade MI yet another patient who shows considerable strength in the long flexors but has not yet regained voluntary power in the thenar muscles comes into the same low cate-Similarly with the ulnar nerve a patient who has recovered only slight volun tary power in the hypothenar muscles is classified as grade 2 which is the grading for another patient who has regained voluntary power in all the intrinsic muscles, though not sufficient to act against resistance necessary to introduce intermediate grades for each nerve and the following system has been adopted in this paper. It is presented at length herein since others may find the classification of use in the accurate assessment of recovery

M.o No contraction in any muscles

M.J. Return of voluntary power in the proximal ALT Return or voluntary power in the protunta-(long flexor) muscles although they are not able to act against gravity

tragamat gravity

M 1+ The proximal muscles act against gravity The proximal muscles are acting and there is a contraction in the hypothenar muscles at least

as a contraction in the hypothesiar muscles at least with either no action in the interessel or not more M.3.+ The proximal muscles and the intrinsic muscles are all acting and the first dorsal interest

muscles are an acting and the movement but does of act against reasonance

M 3. The long flexor muscles the hypothenars

and the first dorsal interesseous act approximations are approximated as a second section of the first dorsal interesseous act against re

M.4. As in grade 3 but some independent lateral movement of the fingers is possible. MI4+ Recovery to grade 4 but the independent

The subdivisions are the same as for the median The subdivisions are the same as not the medical nerve and will be dealt with under that heading

M.o No contraction in any muscles

M. T. A definite contraction in the proximal (long At I A densite contraction in the proximal toughtern fector) muscles but they do not act against gravity but there is no return of Power in the thenar muscles at there is no return to power in the themse muscles are against gravity and there is a flicker in the thenar muscles

no mere is a meact in the menast minoric at M. J. The thense muscles act against resistance. At 3 And themar muscles are against resistance.

M.4. All muscles act against strong resistance and some independent action is possible

V 5 Full recovery in all muscles

## So No recovery of sensibility in the autonomous zone of the median nerve

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S. I. Recovery of deep cutaneous pain sensibility

of Accovery of deep cutaneous pain sensionity within the autonomous zone of the median nerve Thin the autonomous some of the methan nervoir S 1+ Recovery of superficial pain sensibility 2 1. Accovery of superical pain and some fouch sensibility

State Recovery of superficial pain and touch mailthan shoundhard the mailten area but with of the necessary of superiors pain and touch semi-bility throughout the median area but with ver response
\$\frac{5}{3}\$ Recovery of pain and touch sensibility with disappearance of over response

suppearance or over response

\$3.4 Recovery as far as \$3 but localization of the stimulus is good and there is imperfect recovery of

## RADIAL MERVE

M.a. No recovery Motor Recovery

MI Return of voluntary Power in the proximal At 1 return or voluntary power in the production muscles but not sufficient power to act against

Mr. Return of power to the proximal muscles AN 1+ KERLIN OF POWER TO THE PROXIMENT INDUCES.

SUBSCIENT TO SET ARRIVED NO TECHNICAL IN THE muscles acting on the thumb

M 2 Return of voluntary power in the proximal muscles and the muscles acting on the thumb but numerics and the musics acting on the industry out the latter are not able to act against remainder to the control of the cont ne latter are not anic to act assume translation M 3 Recovery to M 2 but abductor policis and extensor policies longue act against re

Proximal and distal muscles are acting and frozing and unital inductes are acting strongly against resistance and some independent movement of the fingers is possible. to rement of the impers is possible.

M.4. Independent movement very good but not perfect. M 5 Complete recovery

Intermediate grades as for median nerve may be

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TABLE II -PRIMARY SUTURES OF ULNAR NERVE IN ARM

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File No Type of second Associated is	Associated icross	Time after Tage after 12 pary	Septem	beta of sectors	Celma	Grada	Days after	Secondary operative sackage	
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D <sub>s</sub>	Operative	Rapture of tracepa	Part and	-	At ribow	+	(Anomalecus imprior map- phy)	í je	
C 30	Genebet	Muscle damage and medica serve daymen	A few hours	+	CR. above modul ep- condyle	-	Xous	*	Separation of strange Re-

Forther recessivy probable.

large that it would have precluded primary suture. Some arbitrary classification must be made both as regards extent of the gap to be closed and the interval that elapsed before suture For purposes of comparison we have thought it reasonable to use those secondary sutures performed within 6 months from the date of injury in which the gap was less than 6 centimeters. There must be few wounds in which primary nerve suture is feasible which are not fit for the secondary operation within six months.

### RESULTS

### Clinical Review

a Clinical review of results of primary nerve suture-High ulnar sutures (Table II) The quality of recovery after prunary auture of the ulner nerve above the elbow was not good but recovery of power in the intrinsic muscles of the hand is usually poor after high lemons. whether suture is performed early or late. In 2 of the 6 cases (1 and 3) the final stage of recovery had been reached-in Case I the result was moderate and in Case 3 poor

Low ulnar nerve sutures (Table III) There were 20 cases in which the ulnar nerve was sutured in the forearm at the primary opera tion. In Cases 22 to 26 resection and resuture were performed before any appreciable recovery could have been expected. In Case 21 suture was of the sensor, division only and one patient (Case 20) drowned before there was time for recovery to be well advanced.

The remaining 13 cases had sufficient time to show a considerable degree of recovery Of these 2 (Cases 7 and 8) reached grade M.4 in which some independent lateral movement of the fingers was possible. One was a boy aged 7 years which is significant since it has become clear from a study of many nerve in juries that the rate of recovery is more rapid and the quality better in children than in adults. Two others reached grade M 3 Three patients recovered to grade M 2 In one of these an anomalous branch was found arising above the lesion and joining the nerve again below the site of division. The sparing of this branch might have enhanced the qual ity of recovery In Case 13 the primary suture was performed at the Wingfield Morris Hospital and the lesion was re-explored 19 months later because recovery was not proceeding satisfactorily. There was a large neuroma at the site of suture.

In the remainder the recoveries were poor although in Cases 14 15 and 16 the assessment must not be regarded as final.

Median merce sutures (Table IV) There was only one primary suture of the median nerve

CHARY ET AL DE
TABLE III —PRIMARY SUTURE OF NERVES  Com No.  Char No.
III -PRIMARY SUTURDS OF NERVES
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Associated lesions Sylvestree Sylves
There after Servel -
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TABLE IV -PRIMARY SUTURES OF MIDIAN NERVE

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10 10	Laceration	Tendos de Impi	A Sew less	-	W riet	N4 1+	Boo	
7	Laceration	Trades da reage	) is he	-	CRE alleve parcierse	E p+ (sampail our motor supply)	Ekü	
N 13	Lacoration	Trades damage Ultur nerve lesses	les	-	Car spone	N 1 E 1	<b>S</b> co	
t	Lacuration	Tendez dezego	krs	-	i car apena	и в	PRO	
P. 1	Laceratum	Tracion damage (Itaar nerve looken	ş km	-	S CM above placture	<b>и, 1</b> ,	700	
W. 49	Lacoration	-	A few less	-	Mid foreign	n r+	,	
\$ 14 30	Lacristics	Partial clinar necve leaves	ko	-	W rest	и с+	1000	
c'is	Lacerston	Tendos demogr	ó les	=	Fret	и в	600	
7707	Lecuration	Tesdon damage	Immediate	-	¥irbs	H) E	N/a	
p.14 63	Laceration	Tendes demays Ulast acres lesion	A few hen	-	cm styre panions	и в	1400	
5 11	Lacuration	Nucle damage	A few lon.	-	Not feetern	H E	3100	Hard sewana. Repetur
J 40	Lacerations	Tresion damage	kn	-	N rest	и	140	Separation Regulates
11 14 P	Lacoration	Tenden derroge	kn	-	N rest	***	90	Soperation Restare
c du	Laconstone	Tendes damage	krs	=	Welst	-	*	Hard searens. Reputare
G**	Lacoration	Tender dissert	lar .	_	Rost		45	Hard passesses Regulare
****	Lacocation	Tenden danage Utana perro issues	1 hrs	-	Mid Serenza		19	Hard secretary
Feeth	er receivery probe	ble						

above the elbow and there has not yet been time for recovery to be well advanced

In 17 patients primary suture was per formed on the median nerve in the forearm. In 13 sufficient time had elapsed for substantial recovery to occur. In 3 the grade of recovery was very good with return of touch sensibility throughout the median area of a

TABLE V-PRIMARY SUTURES OF RADIAL NERVE

Care No			Primary			Rec	OTTETY	Secondary
File No.	Type of wound	Associated lerious	Time alter fajory	Sepain	Site of setting	Grade	Days after	operative andings
D 3	Charthot	Compound fracture humserus	£ þrs.	-	ng 5 cm above special epicon- dyle	Na L	1000	
ť,	Genebot	-	t4 krs	-	16 cm above medial rpicon- dyle	No 8.	1300	
H.#1	Genehot	_	t krs	+	o.o cm. above medial epicon- dyle	M., 3.	2404	
j*	Gumhot	Compound fracture burnerus	y hrs.	+	em. above medial epicon- dyle	M.3 51	450*	
D 40	Gmahot	Compound fracture humerus	å days	+	18 cm. above lateral epicon- style	BONA	300	Separation of stumps. Less turn
2	Genehot	-	I kn.	=	o cm above lateral epicon- dyle	BOQUE	70	Hard neurona Resuture
y, ,	Operative	-	Impediate	-	Elbow	3454	40	Separation Resultare

Further improvement probable.

degree sufficient to localize the stimulus and to distinguish the points of a compass less than i centimeter apart. One of the patients was a girl aged 5 years. In 3 others two-point discrimination and localization did not return so well but there was no over reaction to pun prick. In Casea 35 and 36 there were moder ate sensory recoveries but in the remaining 5 recoveries were poor although further im provement might occur in 2. In 6 patients (including 2 mentioned above) the site of primary suture was explored and secondary suture undertaken. They will be considered later.

Radual nerve sutures (Table V). There were 7 cases of primary suture in 5 sufficient time had elapsed for some degree of recovery to be apparent in 2 re-exploration and suture were performed at an early date

Of the 5 I showed good recovery, I moder ate, and 2 fairly poor the last 2 may improve further since they have been followed for only 15 and 18 months respectively there was one failure

Sciatic nerve sutures (Table VI) In 3 patients the posterior tibal nerve was sutured at the primary operation with recovery of touch and pain sensibility but persistence of overreaction to pin prick. There was only I

patient in whom the main trunk of the sciatic nerve was sutured at the primary operation. The site of suture was explored and resected before recovery could have occurred and this case is considered in the histological section.

There were no primary sutures after wounds involving the lateral popliteal nerve

b Comparison of results of primary and early secondary sutures. The results of primary and early secondary sutures of the ulnar nerve above the elbow are shown in Table VII Most of the gradings are not final but it does not appear likely that the results of the final comparison will be significantly different. In none was there motor recovery to grade M 3

Low ulnar nerve sutures (Table VIII) have good and poor results in both groups, but it is clear that the general standard of recovery after secondary suture is better than after primary suture. Two out of 13 primary sutures had reached grade M.4 compared with 4 out of 12 secondary sutures. Four primary sutures had reached the stage at which the intrinsic muscles were acting against resistance (M 3) whereas 8 secondary sutures had reached this grade. Although there are 3 primary sutures in which furthe progress is likely 4 secondary sutures shoul improve still further.

TABLE VI -PRIMARY CITTIES OF SCHATC MOONS

	F#######	******	***********	***			~~~~~	
Case No.	Primary Mermanian			1	ently	Secondary		
Age	Type of sured	Amodated present	Time after	Seçuis	filts of paters	Crede	Days after sature	Enchange
(A) Make	sciette proch Laceration	Marcia demaga	ş bre.	+	Lower becter of ghroug maxi-	Neet	tigo	Separation, re-
(b) Peet. 51 5 15 50	hhial porte Crambot	-	S-m	-	Salon mater Interior	s	1700	
*4	Lacaration		y kes	-	S CR. aborto mellocias	•	†oe	
1111	Consider	-	y ha.	-	Partial division 5 Cm. above malinois	L)	2.8 PD	

Three of the 9 secondary natures of the median nerve (Table DA) reached a high grade of recovery compared with 3 out of 13 primary sutures. Six out of the 9 had reached grade S 3 compared with 6 out of 13 primary sutures. The contrast between these two groups is not striking but the balance is in favor of the secondary sutures. Four of the latter have not yet reached their final stage and 3 primary sutures may show some improvement latter.

The high quality of recovery after early secondary suture of the radial nerve is at once apparent (Table V) Six out of 8 secondary sutures reached grade M.4 compared with

TABLE VII.—COMPARISON OF PRIMARY AND EARLY SECONDARY SUTURES

Hath Ulasar Norve Setares Private Centr Securiory Deys siter Care Mc Grada et M 45 4 37 H +\$1 3 64 ы +\$ 780 Z.T 1305 4 4 -\$ to Cro M :50 160 -D n

Turbe startly probable

one out of 5 primary sutures. Further improvement is likely in 2 accordary antures and also in 2 primary sutures. Allowing for the recovery of these sutures to the next grade, the belance would still be strongly in favor of the early secondary sutures.

Two early secondary satures of the posterior tibial nerve resulted in recovery of a similar grade to that after primary sature, but the value of comparing recoveries of this nerve is probably not great, on account of the difficulties in grading sensibility on the sole of the foot.

The comparison between recoveries after primary and secondary nuture is set out in the instograms (Figs. 1 a, 3) in which the motor or sensory recovery is plotted along the abscuss and the number of cases is plotted along the ordinate. The method has limitations afnor the time interval after suture is omitted, but an indication is given of the cases likely to above further recovery i.e. where the assertment was made less than six hundred days after operation.

Now that the data in each group have been presented we can depict the results in the whole clinical series in the form of a single composite histogram. For this purpose we have recorded the motor recovery of the ulnar and radial nerves and the sensory recovery of the median nerve on the same histogram. The result is shown in Figure 4 in which the more uniformly good results after early secondary suture are at once apparent. The number of recoveries to grade M4 or S3 after secondary suture is r6 out of 34 with 7 intermediate re-

### ZACHARY ET AL PRIMARY SUTURE OF NERVES

### TABLE VIII.—COMPARISON OF PRIMARY AND EARLY SECONDARY SUTURES

Early Secondary Primary RECEIVED Paravers Case No. File N Calvaties Calvanian Dave fter Dave after Grade Grade PR CO.CO 1/W for 6 M M.4 M-4 53+ M.4 5 4 ---H. 4 M4 81 D 7 MARI B 40 + 820 + 630 C-10 M4 84 mo J/W fter Wet Ma S efer\* s/W for & M. N. 5. + M. 7 115 83 100 • B. Ca /W for yr M 1 5 Ma S -A.s. + 110 Δ v6 Cus M 3 Sensory branch spared + 540 0.27 士 M 3 5 3 720 W for a M. Ma+8 400 B 55 M. +-5 L 4 77% Ma+8 t tAon 7 + Mats at R. s + M. s+8 s , s Ltoo 5 11 ÷ M.+8 140\* Caro \_ M 2+5 všq. No 8 400 1.30 450\* r.; T.48 1600 200 w i ı. 4 100 + М 3 tiline

of other recovery probable.

coveries of lower quality. In the group of primary sutures 9 out of 39 had reached the same high grade with 9 other recoveries at an intermediate stage. However even in the incomplete recoveries the quality is higher in the early secondary sutures 9 out of 11 intermediate recoveries in the early secondary sutures had reached M 2+ or S 2 whereas none of the corresponding primary sutures had recovered so far

c Associated factors. Why do these results not bear out the theoretical superiority of primary nerve suture over later repair?

What adverse factors may have impaired or prevented recovery?

Age Two primary sutures were performed on children aged 7 and 5 years respectively (B.40 and 0 10) and both resulted in a high grade of recovery The influence of youth on the quality of recovery is shown by another case not in this series. A girl aged 9 years sustained a division of the median nerve which was repaired 3 years later. Eighteen months after operation there was recovery to M.4 S.3+ equal to that of the best primary suture. There were no children in the group of early

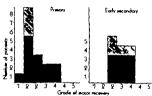


Fig. Histogram showing recovery after primary and early secondary sutures of the ulnar nerve. In all histograms cross hatched area indicates intermediate grade of recovery; black area final grade of recovery

secondary sutures and with this exception, the ages in the two groups are comparable almost all being between 20 and 40. The results in this group of primary sutures have been enhanced by the inclusion of these two children.

The type of injury Of the 14 gunshot wounds in which primary suture was per formed, 12 had sufficient time to show recovery Three of these reached a high grade M4 or S3 and 4 others in grade M 2 or S1 may atill improve (Fig. 8).

Twenty-seven lacerated and incised wounds, aimilarly treated, showed 6 good recoveries (grade M.A. or S.3) and 5 in the lower groups

may improve still more

There is no conclusive evidence from these figures of any clear superiority of primary nerve suture in lacerated and incised wounds over that performed in gunshot wounds.

Sebiss Three primary sutures were fol

lowed by gross sepsis and at operation the

TABLE IX —COMPARISON OF PRIMARY AND EARLY SECONDARY SUTURES

		Lev Ked	ca Nerva Setura			
	Primary		Secondary			
Case No 1 le No	Grade of re	Days after sectors	File Me	Grade of re-	Days after esture	
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ð,	£3+	2404	B 35	\$ 3+	3100	
	W 6.		-	и з.		
, Y	и в,	race	<u> </u>		Pond	
ť	R 21	100	Dы	N 4 8 1	7000	
<b>#</b> 7	М1 63	1300	Pur	Ma+6	1000	
			[			
45,	N 8 2+	90				
9 19	M4 8++	900				
c K	74 ±4	-	14	H	<b>#</b> 0	
	10	900	ъ	N FE	9000	
1		•00			<b>3</b>	
P3,	R 2	4307				

I N +5

Ten N +5

Truther recovery probable

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sutured stumps were found to have separated In 4 other cases the wound became infected to a moderate degree after the primary operation, but in none of these has recovery reached the final stage. Figure 6 shows the results after all those cases in which the wound be

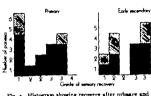


Fig. 2. Histogram showing recovery after primary and early according actures of the median nerve.



### TABLE \ -- COMPARISON OF PRIMARY AND EARLY SECONDARY SUTURES

		l' losary			Ea ly t	econdary	
		Recove		Titry		Recovery	
Case No. Calvanium	(lalvanism	Grade	Days after subure	File No	Galvanism	Grade	Days after
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	1		1	F 4	-	M 4+54	1\$10
	i	Ì	1 1	Me 13	1/M	M4+53	140
-	<b>\</b>	<b>\</b>	1 1	27	-	M++5.	1100
			1	F 14	3/%	M-4+5	Bog
115	-	N- 5	1000	r s	-	M4 3.	850
X 1	-	31.3 5	300	N i	-	<b>И1</b> 51	720
1147	+	× ++ 5	340	T 37	I/W	31 ++5 :	450*
<i>j</i> ;		31 s+8 s	4574		<del></del>		
	1 100 101	- N					

Karther property reshalls

came infected were eliminated. Although the results are better than when the infected cases are included, there is still a considerable proportion which have not reached a high grade of recovery.

Physical trealment The two principal types of physical therapy which may have in fluenced recovery—and so far as we know only motor recovery—are passive movements to preserve joint mobility and electrical stimulation of the paralyzed muscles. The first is irrelevant since only 1 patient (P 21) had limited mobility of the joints of a degree sufficient to interfere with the function of the recovering muscles.

The influence of electrotherapy on the quality of recovery is very difficult to assess Only those cases are available for comparison in which motor recovery is the criterion namely ulnar and radial pulsies. I our teen out of 21 received electrotherapy but the intensity frequency and duration of the treatment varied between such wide limits that it would be unreasonable to place too much reliance on the pooled results and in any subdivisions the numbers which were included in each instance would be statistically insignificant.

The histogram (Fig. 7) shows no evidence a significant effect of galvanism on the qualit

of recovery in these primary sutures

It is clear that the factors we have
discussed do not fully explain the failure of
such a large proportion of primary in
sutures to reach a high grade of recovery.

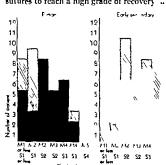
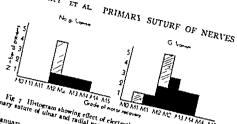


Fig 4. Histogram showing recovery after prime early secondary sutures of ulnar median, an nerves



malk sature of alpat and tadfal netter 

Fig. 7. Illitogram showing effect of electrotherapy on recovery after pri

CARE 23 G.42 January 10 1933 patient suf-Operation on left writt causing unar parati-operation was performed within 1 hour The ar nerve and several tendons were suitted. The u ut peric and several tendons were sutured. The street in palmar flexion for 3 weeks. May 182 Moris Hospital Vo recovery Var 26 1043 Morris Hospital to recovery they 30 1945
Accasion was performed under seneral anesthesia ACT PAGE A JUNIOR DESIGNATION OF THE PAGE AND ACTIVE AND ACTIVE AND ACTIVE AND ACTIVE AND ACTIVE ACTIVE AND ACTIVE AND ACTIVE ACTIVE AND ACTIVE ACTIV here was a justicism neuroma on the ulnar nerve surrounded by dense scar insue Measurements surrounded by denie feat insue Vicasurements
consistency Stimulation Produced in Motor re consultano atmusation produceu no motor re sponse. Resection and resulture were performed.

Illistodes. The specimen was examined in finaltype section at five levels. \( \) Kond return that

A condition has write section at five level. A food reunion has aken place for intact protimal and dreunion has been exertised by less than millioned and distributions. ARCH PIACE for inflact Proximal and dural ounder acceptable by less than 4 millimeters and the gap to the control of the contr between them is full of Schwann there and the gap between them is full of Schwann there all directed between them is full of Schwann tissue an directed along the long axis of the nerve with a very small siong the long said of the nerve with a very propertion of scar tissue (contrast Cite 2). proportion of scar tissue (contrast care 23) but there is from abnormality of the codoncurrum of the care is the desired track. there is known abnormality of the cononcurrum of the bundles in the datal brunk, for over a length of about 10 millioneters immediately below the subre about 10 minimeters immediately ocidy the autification for the condomination of the condomina fine the engoneuras connective turne is some of a dense network of thick collections fibers form 8 and 9) This bures is a varying severily out at the arrive it is greatly excessive and are a consistent formed after excessive This fibrosis is of varying evening but at Almost all points in the nerve at its greater excessive as compared with the condition found after 4 months. as compared with the condition lound after a months of uncomplicated. If ellerian dependention. This is Of incomplication is subtrian describation, and in incomplication and in the transverse action at the exclearly abown by the transverse section at the exfeme dutat end of the specimen where the nerve shows the normal structure of a 4 months depend on the specimen where the nerve shows the specimen where the nerve shows the specimen of the specimen shows the specimen of the specimen shows the Anors the normal structure of a 4 months of the structure of a aci stump. The contrast between the two levels is of story of an at low power of manifection of contrast services and a low power of manifection of contrast of milimeters of myelinated server contrasts at the site of primary of the milimeters of the site of primary of the site of primary contrasts of co but with severe endoncural collections are an endough from the data! trunk immediately below the auture and the data! natine dutal triox immediately below the suture need this abnormality would certainly have prooc 1 on appointably would certainly have pro-bled a permanent har to the regeneration of normal

CLE 34. J. J. January 5 1944 patient received laceration of the left wrist causing ular parity and the left with a causing ular parity in Accretion of the set with causing utner paralysis.

The mass rows hald in a fixed within a few ramary suture of utnar acrive occurred within a lew bours. The wrist was held in a flexed position by plaster. March 38 1044 Patient was admitted to

the Wingfield Morris Hospital the Unificial Morris Hospital There was compared to Electromiversam of hypothesis muscles netre Electromyneram of hypothenar musicies operation was performed under local anotheria. operation was periorined under local ancioness. The would scar was continuous with that of the The wound scar was continuous with that of the divided tendon of the dexor carpi ulnaris and with the continuous with the second with the name of the second state of divided lendon of the liexor carpi ulnaris and the nerve the scar immediate) around the nerve The neurona measured (5 b) 0.8 by 0.5 centimeter the Track around the dutal Portion was firm and the dutal Portion of the second proximal portion was him and the outel portion hard. Thick suture material could be seen emerging nam 1 nick suture material could be seen emerging from the posteriog aspect of the neurona Resection

from the posterior aspect of the neuroma Resection Histology. The longitudinal section through the Histology The longitudinal section through the far separated but that the stumps are not completely obstituted by path of sumps are not number of the stumps are not number of the stump obstituted by numerous master of numerous master of numerous master of numerous masters of numerous m completely obstructed by numerous masses of construction by granulation there and mature collagen

no mature coursen
Conclusion Reunion was prevented by fibrowing at the auture line much of it due to the presence of the auture that much of it due to the presence of the first the fi autore material between the stumps

(Astr. 36 D.43 December 30 1033, patient

Tournell a laceration of the left write by Risse

and Astronomy and Astronomy and the set with the set of the set with the set of t

received a laceration of the left wrist by slass, plial 35 minutes later. Immediate operation was pital 35 minutes later turneriale operation was performed and the dexor carpi ulmans and ulman series were found to be divided. Both ward sutured to the contract of the contr nerve were found to be divided that were sutured tained by platter for and the Position was main formal adjusted to the Wingfield 1991 flower and the Position was main floopital Examination to the Wingfield 1991 and actually in the hypothenar muscles. The latter Atomical examination revealed positive of activity in the hypotheriar muscles or activity in the hypothemia musics the latter and the first dorsal interessions responded to fared t and the lift dotted interested a reponded to tared to tare a high threshold the stimulation produced no response. There was complete sweating ducted no tempores. There was complete sweating and sensor loss in the ulnut area offered to 1944. The latter

and sensory ioss in the unar area. March 1 tour A hand of some averaged ander local architectural and a hand of some averaged and form the source of the sensor and a hand of some averaged and account to the sensor and a sensor a sensor and a sensor a sensor and a sensor a sensor and a sensor a sensor and a sensor a sens Operation was personned under local anesthesia A damp of scar extended down from the sain across the nerve just distal to a small neuroma. The latter the nerve just distal to a small neurons are surject to by 0.8 by 0.5 centimeter and was irregularly firm but out hard. Stimulation below the motor or amount response for the surjection of the INTERDATION INTO DATE DES DERIL. DEMPURATION DES OFF THE DESCRIPTION DE LA PROPERTIE DE LA PRO terior and require were performed.

Histology The proximal and fistal (runks he than the than and many comment) to such other (Fig. 12)

Cose together are proximal and miles trues he other type (2). Thus the out opposed to each Thus the outstowths from the

SURGERI GINECOLOGI AND OBSTETRICS TABLE XL-PATE OF JOINT

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proximal and dutal bundles have largely failed to mile. A few fine axons only are to be found in the nerve below the suture line.

Conclusion Poor reunion as a result of inaccurate apposition of the sample or rotation after minre CASE 35 R.60 (age 62 Jessa) May 22 1044, patient suffered lacoration of the right foream driding median and ulmar nerves Primary sature of nerves was done within 3 hours. September 8 on nerves was some within 3 nours, perfember 8 Hospital to recovery Although recovery was not noduly delayed it was decided to explore the lesions. unually unavers in was universal to expend one answer.
September 0, 1944, operation was performed under September 9, 1944, Operation was personned united local accetheria. The ulnur nerve was found em local anestment, the unitar mayor was sound embedded in dense scar and adherent to tendont. The ucatoms measured to by 1 ph o 2 confineral and remove in common a reneuroma measures 4.0 ov 1 oy 0.3 centimeter and Trust section of the site of as commercially has main than section or the sact with the revealed dense scar. Resection and resulting performed

Histology The proximal and distal bundles at the History the promusation unias outside a state of unias experience of a true are experience by a gap of about 7 millioneters and thus is filled with dense Kar tours. anumeters and this is much with dense was more for little Schwann-things unites the two stamps, so yes, after one amount of the two stamps, so that the dutal nerve is poorly reinnervated, and contains only a few very fine arons.

contains only a few very line arous.

(onclusion Very poor revulon the stumps are separated by a gap filled with scar tissue.

PARENCE OF SAP MENU ALL AND LOSSES.

CASE 1 COS JANUARY J 1944 Patient suffered

American and core All 4 O3 January 3 1944 Petitur saucreo a laceration of the right wrist Operation was per formed within 3 hour. The median herve and second teachers were severed. The tendent were torner street severed. The tendons were repaired and the ends of the median nerve trimmed tepantu and the citas on the inculan nerve transcent and satured with the wrist fored. The wrist was and stutted with the wratt fixed. The wratt was amodolized in planter for 4 weeks. March 10 1940 positions was admitted to the Wingfield Morris Hospital, Von receivery. March 31 1944 operation. reas performed under general anesthesis. There was a hard neurona measuring 2.0 by 1.0 by 0.5 cmt meter Stimulation of the nerve above the lexico produced no response in the themat muscles. Re section and resulture performed.

Hatology The specimen country of a featform furning with considerable chinemial scar which

increases as the aile of suture is approached Suture material is visible near the proximal and distal ends of the receted segment—an industion that some separation had probably occurred. The columns of Schwann cells at the untire line and the dutal to outwant tens at the suture time and the distance in widely separated by sear throse in outsides are aware separated to the under in neutron there is a name connection of the data! trunk over a length of a few millimeters below the source line (see Case 35. Fig. 8) No myelinated fibers are present in the dutal nerve bundles.

Conclusion A poor union with separation and fibrosis and with abnormality of the endoncurum immediately distal to the suture line. CASE 43 G-46 September 1943 patient re crited a laceration of the right wrat. At operation cerves a succession or one right wint, at operation 134 hours later the radial artery and appendical

radial nerve, several tendors and the median nerve remain neave, services tensions and the member near series found to be directed. The tendons were reneite touted to be currectly and touted with very pearty and the medical mayor has solution with very time silk. September 14 1943, patient was admitted to the translated translated the translated translated to the translated translated to the translated tran to the Wingheld Morris Hospital. October 13 1945, operation was performed under local anesthesis. A pard fundous neurons on the median nerve uses observed was becomen on the median neurons of the median nerve uses street 1.4 by 1.0 by 0.5 centimeter Stimulation below the lealon produced no sensory response and the lesion was resected and resutured.

History The distance between the proximal and distal bundles is small, about a millimeters The out growth from the proximal bundles can be seen streams out familie into a bed of granulation aprending our managements a occur or grammanous in which the collagenous elements are disoriented and become denser as the distal bundles are approached The outgrowth from the two stumps is approached the outgrowth from the fine attumps in not toward each other but to opposite sates of the position at the time of printing sates of the position at the time of printing sates. There are not only well toward the sates of well recommendation between collections will toward the position at the time of primary surface, there are numerous foreign body guant cells well toward the numerous concept and small come were consecutive of the lexion, and clearly amounted with ruture material. Ao arms are visible in the distal apposition.

string material. An arous are vision in the dutast bundles, which they would undoubtedly have reached after 4 weeks had the string been successful. A poor union as a result of faulty

Spontion.

CASE 44. R.60. May 22 1944 patient received a laceration of the right foreign with division of nection of the right success while coloring median and nimer nerves. Primary source of nerves was done within 5 hours. September 8 10st, parties was admitted to the Wingfield-Morris Hospital. No recovery September 9 1944 operation was performed under local anathesis. The median nerve was surrounded by dense sear the neurona measured 27 by 0 6 by 1.0 centre was the measured. Trial section revealed only one food bundle. Re section and resulture were performed.

Histology The gap separating the proximal and dirtal bundles is amail, but the intermediate zone country latters of quite matter of collates with comments ungery or occurs masses or causages with a some agreement of inflammatory cells. Through this scar tissue there has been only slight reunion of time scar these there has been only sugar remnor of the stimps and the distal frunk contains no mye tor stange and the times and a contain or my limated fibers some of the buildles contain many

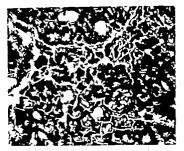


Fig. 8. Case 33 Detail of the endoneurium in a nerve bundle about 8 millimeters distal to the suture line. Most of the Schwann tubes are very small in diameter and are surrounded by dense blocks of collagen. Masson, ×645

axons, but others few or none The endoneurium of the distal bundles shows an excess of collagen im mediately below the suture line Conclusion A poor reunion with grossly excessive

scarring between the stumps

CAST 30, S5 5 June 20 1042 patient suffered a
laceration of the right forearm. Operation was done
within a few hours. The median nerve was found
divided in the middle third of the forearm. It was
sutured with fine sulk after trimming. Plaster was
applied with the elbow fiexed go degrees and wrist
fexed 45 degrees and maintained for 2 months
August 25, 1042, patient was admitted to the
Wingfield Morris Hospital. Complete median para
lysis below branches to long flexors. Daily physiotherapy started including galvanism to the thenar
muscles. July 5, 1043, the only signs of recovery
were a flicker in abductor pollicis brevis and a slight
decrease in the area of auslgesis. Operation was

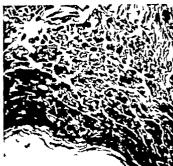


Fig. 9 Case 23 Detail of the endoneurium in a bundle about 6 millimeters distal to the suture line. Similar to Figure 7 but the endoneurial collagen is even more dense, and the Schwann tubes hardly distinguishable. Marson, Xô7o.

performed and a neuroma measuring 2 5 by 1 5 by 10 centimeter its proximal part soft but the distal portion very firm was found. Stimulation produced a motor and sensory response but in view of the consistency of the lesion it was decided to resect and resulture

Histology The lesion consists of a fusiorm awell img composed largely of nervous tissue. The proximal and distal bundles are connected by tissue consisting of abundantly reinnervated. Schwann tubes (Fig. 33) with only slight excess of connective tissue. The distal bundles are uniformly innervated by small myelinated fibers (Fig. 15) except for half of one bundle in which myelinated fibers are as numerous at the forent. Myelinated fibers are as numerous at the

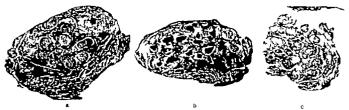


Fig to Case 23. Low po er views of transverse sections of the nerve a, immediately proximal to the atture line b o millimeters distal to the suture line c, at the extreme distal end of the specimen, about 15 millimeters

distal to the suture line. a and c show normal proximal and distal nervous tissue respectively but in b the excessive endopenrial collagenization is manifested in most of the bundles by their deep staining Masson, X13.



Fig. Case 24. The specimen in longitudinal section of statute p. Proximal Serve bundles. showing the air of square // Provinces perve ounders, D datal nerve bundles, S remains of square material and Description of the property of ancemen sear-many minima masses as those indicated by pointers, X3-7

dutal level as at the frozinal level above the autore Contain return as at in fortunation of accordance according to the plane not yet returned to a normal

otam (et (c) r/m 14 and 15/ Cocclusion pratently a good reunion The hatological report ca ( considerable doubt on the nations and resultire in this case, and it seemed reasonable to accept the specimen as showing good union and good reinnervation. However, one such their secondary suture the patient had re year after sectionary sucress the patient may be sained atrong action in abductor policies brevia and Samen arrows account in account pours a mero and there was touch and pain sensibility to the tips of the digits with no ver reaction to pin pine. Thus a later accordary suture had proved superior to a a state secondary source nad proven solvense to a primary suttree in which histological examination

CASE 51 R 31 March 19 1943 patient re CAME SI K 31 AMERICA 10 1043 PATIENT TE crived a function wound of the left arm acit tissue wound and palsy Operation was performed 5 home later excesses of sound came along the would read a party Operation was performed hours later excusion of would nerve almost com hours later exchanged awound herve almost com-pletely severed. Small piece of bruned nerve was exceed from dutal end. Verre satured with ally The wound closed with gauge dia n. April 7 1943

Patient was admitted t the Wingfield Morris Hospital May 25 1043 operation was performed under Pota, stay 25 1943 operation was performed under the formal anotheria Ancuroma 1.5 continuetra long, film commence was found. The dutal trunk left firm for a contimeters dutal to the neurona, Re firm for a centimeters out at the neutrons, section of neuroms and 4 o centimeters of the datal action or neuronia and a occurrence on the omia frunk were done, keaving gap of 7.0 centimeters Suture was performed

Histology The longitudinal acction of the speci men showed that the stumps were well appeared and reasonably close together. In the intervening area tonsmany these together in the intervening area, however, there has been a considerable irregular prolif ration of fibroblasts with a deposition of young collagen this has caused a lateral diversion of some of the outgrowth of nervous taste from both stumps with some neuroma formation (Fig. 16) let many regenerating fibers have reached the dutal bundles and have acquired myeln sheathn. In the outures and more acquired inventor americas an one concerning to the auture line the reinnervated Schwan tubes are widely separated from each Octavan times are watery separated from each coulder Prung the appearance of gross edema. The confidence of this change is uncertain but if such a confidence of the change is uncertain but if such a confidence of the change is uncertainted. againstance or conscious to source and one conscious and one of the constant o liferation in the spaces it is an abnormality which would have had an adverse effect on recovery Onchusion A fairly good junction but with some failure of union of the stumps and gross edems in

b Summary of histological findings There were 5 chief histological abnormalities in these

specimens sometimes more than one abnormality was evident in a single specimen. I Faulty apposition the proximal and distal bundles were directed toward different aides of the nerve

2 The presence of auture material between the sutured stumps.



showing the air of solute promises in songtonnas section p p ormal nerr bundles Case 16. The specimen in ionguladinal section age the sit of sature FF orthogs here bundles, area of represents outground from the mountain area of regretative outgrowth 1 on the province D area of Schwarzian Purches  $\nu$  that then Dundles  $\nu$  area of Schwarzen and mesodetimal outgrowth from the datal bundles  $\times$ 



Fig. 1 Case 30. The specimen in lengthedmal section, above using the act of setters. P. Froumal bundles D. distall bundles. Act on the Control bundles D. distall bundles. the form of small brodden thomby a few neuron these the form of small denotes th only a less negatives areas, is continuous past the suture line XJ 5.



Fig. 14. Case 39. Part of a nerve bundle in a transverse section at the proximal end of the specimen, showing the condition of the nerve fibers above the suture line. Myelin sheath stain. X560.

- 3 Scar between the nerve ends The amount of scar tissue between the sutured stumps was variable but in several cases greatly excessive and clearly hindering re generation
- 4 Excessive endoneurial fibrosis was frequently noticed particularly in the distal stump immediately below the suture line. In some cases it was so excessive that satisfactory regeneration would have been immossible.
  - 5 Separation of the sutured stumps.
- The first two faults are due to poor tech inque in which the suturing has been mac curate. The third and fourth are probably due to inadequate excision of the damaged nerve ends. This can hardly be classed as faulty technique since the fibrosis between and within the bundles would not be present at the time of the primary operation and we do not yet know how to recognize macroscopically the changes that will lead to excessive collagen formation within the nerve stumps. It is also possible that excessive postoperative tension on the nerve could be held responsible.

The separation of the autured stumps may be due to unduly rapid extension of the joint which was flexed to approximate the nerve ends or else due to excessive tension at the time of operation or possibly sepsis. But of the 6 cases in which separation occurred



Fig. 15 Case 30 Part of a nerve bundle in transverse section at the distal end of the specimen, showing the condition of the nerve fibers below the suture line. Myelin sheath stain. X560.

there was only 1 in which the extension of the joint had been unduly rapid (Table XI) Sepsis was present in only 2 cases and undue tension at operation must be considered to be the cause of separation in the other sutures

### DISCUSSION

The first conclusion arising out of these records is that contrary to the widely accepted view the best results of primary nerve suture do not approach nearer to perfection than the best results of early secondary suture Indeed, considering only those cases in which there has been adequate time for recovery the proportion of good results is higher in the early secondary sutures in this series. The scales are weighted still more against the primary sutures if we take into account those in which re-exploration and



Fig. 16 Case 51 The specimen in longitudinal section showing the site of suture P Proximal nerve bundle D distal nerve bundles.  $\times 4$ .



Fig. Case + The specimen in lengthedinal section, and the sate of sature. P. Provincel nerve bundles, section of sature material and states and sections. D CHAIR DETTY CAUGINE 5 TERRAINS OF EXECUTE MEMORIES AND ASSOCIATED SEC. TERRAIN SEC. ASSOCIATED SEC. ASSOCIAT

dutal level as at the proximal level above the suture the though they have not yet returned to a normal diameter (c.f. Figs. 4 and 15)

anceer (C) (18% 4 and 15)
C actualon (prarently a good reunion. The hatological report cast confiderable doubt on the wisdom of resect on and resulting in this case, and t seemed reasonable to accept the specimen as sooving good union and good reinnervation. However, one ROOD URANI AND ROOM ICHINICIVATIANI. HUWEVET OUR SPEEL ACCORDARY MILITIE THE PARIENT HAD TO Year after Accordany father the patient had re-gamed strong action in abductor policis brevs and there was touch and pann Renability to the tips of the digits with no over reaction to pin prick. Thus toe ugas with no over reaction to but price. Anus a later secondary unture had proved superior to a a sater secondary source nad proved solution to a sponed an abhatently ancoragin union

CAS 51 R.31 March 19 1945 patient re crived a guantot wound of the left arm soft times wound. Radial pathy Operation was performed 5 hours later excusion of wound, herve almost com hours tater excision or around, herve almost com-plety severed Small pace of brilled nerve was screed from duttal end. Nerve autured with silk The wound closed with gauge drain. April 7 1043

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Histology The longitud nal section of the specimen showed that the stumps were well apposed and reasonably close forether. In the intervening area however, there has been a considerable irregular proliferation of fibroblasts with a deposition of young collagen this has caused a lateral diversion of some of the outgrowth of nervous finne from both some or the outgoonth of activous cosme from tool (Fig. 16) Yet many regenerating fibers have reached the dutal bundles, and have acquired myelin sheaths. In the nerve distal to the suture line the reinnervated nerve must to the nature that the reinnervated seems tubes are widely separated from each other, giving the appearance of gross edems. The constitution of this change is measured from it makes agnificance of this change is uncertain, but if such endoneorial edema is followed by fibroblast proinferation a the spaces it is an abnormality which meration is the spaces it is an automissing successful have had an adverse effect on recovery one have any an averse curve on according to the series of the series of

Editors of union of the stumps and gross edems in b Summary of histological findings There were 5 chief histological abnormalities in the specimens sometimes more than one al normality was evident in a single specimen Faulty apposition the proximal and distal bundles were directed toward different sides of the nerve

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Fig. 3 Case 50 The specimen in longitudinal section, about in the sate of source. P. Provinsal bundles. D. dottal sacring the size of source / frommal bindles D, destail bindles A & fee fragments of source posternal Vervous ouncies.) A few fragments or source material. Very one tissue, in the form of small bundles. Ith only a few orun cases, in the form of sense observe (x, x, y, y, z) and (x, y, z) and (x

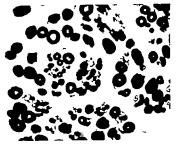


Fig. 14. Case 39 Part of a nerve bundle in a transverse section at the proximal end of the specimen showing the condition of the nerve fibers above the suture line. Myelin sheath stain. X 560.

- 3 Scar between the nerve ends. The amount of scar tissue between the sutured stumps was variable but in several cases greatly excessive and clearly hindering regeneration
- 4 Excessive endoneurial fibrosis was frequently noticed particularly in the distal stump immediately below the suture line. In some cases it was so excessive that satisfactory regeneration would have been im possible

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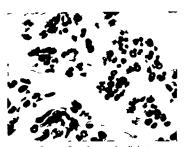


Fig. 15 Case 30 Part of a nerve bundle in transverse section at the distal end of the specimen showing the condition of the nerve fibers below the suture line. Mychn sheath stain. X 560.

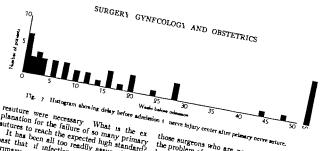
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### DISCUSSION

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Fig. 16. Case 51. The specimen in longitudinal section, howing the site of suture. P Proximal nerve bundle D dutal nerve bundles. X4.



planation for the failure of so many primary

autures to reach the expected high standard? It has been all too readily assumed in the past that if infection can be avoided after primary nerve suture the result should be

good Although in a few of the cases recorded above sepsis may have been an ad verse factor there are many in which the wound healed without sepsis and yet the

We have no evidence that the results in this group of primary sutures have been un lavorably influenced by lack of physical therapy Indeed, an unduly favorable effect has probably resulted from the inclusion of two children in the series. We must, there fore assume that the quality of surgical repair which is possible at the time of the primary operation is a factor of considerable importance The standard of surgery de pends on the experience of the surgeon the facilities available for good surgery and the condition of the injured tissues

It might be suggested that it is unfair to compare primary autures performed by aur geons of all types with secondary sutures performed at a nerve injury center by men experienced in nerve repair. However many of the primary sutures which have failed were performed by experienced surgeons. More over after one of the primary sutures under taken at this nerve center a case in which there were no complicating factors, the results were not good. Furthermore primary wound treatment in peace or war is not usually performed by senior surgeons and tre think it likely that we have in this series a airly representative selection of the work of

those surgeons who are normally faced wit the problem of primary nerve suture. It min be noted that we have excluded from the series three examples of gross error at the time of primary nerve suture when a nerve

Nearly all the primary sutures were under taken at hospitals in this country in which the facilities for such emergency work are ade

In our opinion the chief adverse factor in primary suture is the difficulty in recognizing how much of the nerve has been damaged on each side of the site of division, with the result that resection is often inadequate. On the other hand if the resection is satisfactory there is the risk of excessive tension at the site of suture since extensive mobilization of the nerve is never performed in a fresh wound After 3 or 4 weeks the intraneural connective tissue changes are sufficiently obvious to indicate the amount of nerve to be resected, and there is the additional benefit of thickened nerve sheath which facilitates auture and makes the suture line more stable the epi neural stitches are less likely to pull through such a aheath than they would through that of a freshly divided nerve

One further objection to the selection of cases in this series might be that only those primary sutures which were not progressing favorably would be sent to a nerve injury center many good results would thereby be mused. There are two anappers to this objection first by arrangement with the medical departments of the three services, all cases of peripheral nerve injury are referred to appropriate centera Second it is seldom possible to be sure within 6 months of the

date of suture whether the final result is likely to be good or not. We have ourselves found this difficulty even after sutures at the level of the wrist Thirty six out of the total of 40 patients were referred to us earlier than 6 months after injury (Fig. 17) and it cannot, therefore be accepted that we have had an undue proportion of those in whom the result was known to be poor

### CONCLUSION

The results set out in this paper raise im portant questions of policy in the primary treatment of divided nerves. In the usual civil or industrial laceration where one can expect wound healing within a few weeks primary suture may give a good result, but one can be more certain of a high grade of recovery after an early secondary suture. However there is nothing to be lost and indeed a great deal to be gained by approximating the ends of the divided nerve to prevent retraction. When secondary suture is performed in a few weeks the length of nerve to be resected will probably be short the suture can be performed with precision and without tension and the prospects of recovery will be good. If deliberate primary suture has been performed the patient should be watched carefully for early signs of recovery and if they are lacking or progress appears to be unduly slow re-exploration should be under taken without delay and further resection and resuture considered

In war wounds the local damage to the nerve ends is likely to be more extensive and the chances of performing an adequate excision of damaged nerve trunk and accurate epineural auture at the primary opera tion are not so good. An early secondary suture is more reliable. Here again primary approximation of the nerve ends is im portant and with adequate wound surgery and the latest adjuncts to prevent sepais and encourage wound healing the secondary operation should be possible within a few weeks or at most a few months. Although we have arbitrarily chosen a limit of 6 months for early secondary sutures we are convinced that, even within this period, the earlier the suture is undertaken the better

We can sum up our views as follows Formal nerve suture should be undertaken at the earliest moment when it is possible to recognize the extent of damage to the nerve excise the injured segment and bring together the mobilized nerve ends without the prospect of undue postoperative tension

### STHWARY

- The results of 55 primary nerve sutures are presented and compared with results of a series of early secondary sutures
- 2 There was a higher proportion of poor recoveries and a lower proportion of good recoveries after primary suture
- 3 Sepsis was not the chief adverse factor involved
- 4 The histological examination of the site of primary suture in 16 cases indicated that the chief faults were poor technique inadequate resection of the damaged nerve ends and excessive postoperative tension
- 5 There is a better prospect of a good recovery after an early secondary suture than after primary suture
- 6 Primary approximation of the divided nerve stumps is always advisable

### REFERENCES

GALLIE, W. E. Surg. Gyn. Obst. 042, 74, 370.
GOWALIE AGUILAS, J. Prog. clin., Modi. 1938, 36, 35
HERSHEN, B. Bitl. J. Surg. 933, 156, 414.
HERSHEN, B. Beltr klin. Chr. 1937, 166, 414.
HERSHEN, B. B. and HOLBERS, W. Bitl. J. Surg. 1943

HOURI, C. N. Buli Soc. Chir. 864, 5 205 HOWELL, W. H., and HUBER, G. C. J. Physiol. Lond.

1893 14 1 Joney, D W Field Surgery in Total War London Ha mish Hamilton, 1943

LAUGIER. C rend Acad. sc., 864, 58 1139

LOTHEVANT J J E. Traité des sections nerveuses. Paris

MITCHINER P H Brit M J 1939, 2 124. PLATT H. Proc. R Soc. M Lond 937 30 863 PLATT H., and Baistow W R. Brit. J Surg 1923 11

533
POLLOCK, L. J. and DAVIS, L. Penpheral Nerve Injuries
New York Paul B Hoeber Inc., 9,33
SHERREM J Injuries of Nerves and their Treatment
Loodon James Nisbet & Co. 1708.

## A CLINICAL AND PATHOLOGIC STUDY OF THE KIDNEY IN PATIENTS WITH THERMAL BURNS

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MPAIRMENT of kidney function as evidenced by persistent oliguria and elevation of the nonprotein nitrogen in the blood is a frequent early complication in the course of patients with severe thermal burns. (9,34) companied by albuminum and urmany casts (34) A few descriptions of the morphology of the kidneys in patients dying with burns have been published (9 to 23 34) the most consistent findings being the following-on microscopic examination the glomeruli are usually normal while the tubules show vary ing degrees of necrosis affecting principally the convoluted part Pigmented casts have also been observed in the tubules. These have been considered to be hemoglobin casts although direct proof of this is lacking Some support to this conception of the nature of the casts is lent by the occurrence of hemoglobin oxyhemoglobin and methemoglobin in the blood and urme of severely burned patients (23) In none of these reports however has there been an attempt made to correlate the clinical and pathologic findings study based on 47 patients with fatal thermal burns admitted to the Boston City Hospital during the period from November 1942 to July 1944 is presented here Additional data on patients who were admitted and survived during the same period will be presented else

In the following study the area of burn was catimated by the method of Lund and Brow

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der The depth of burn is described according to the new method of Converse and Robb-Smith. They classify burns by name instead of number using the terms epidermal for so called first degree burns, dermal and deep dermal for accound degree and deep for third degree The area of epidermal burn was disregarded. The extent of the deep burn cannot be determined with accuracy in patients who survive for only a few days. For this reason the extent of deep burn in such patients can only be estimated. Associated respiratory tract injury was graded from 0 to 4, depending upon the extent of injury to the respiratory tract found at autopsy

The local treatment of the burns varied. During 1942 triple dye and tannic acid-silver ntrate were most frequently used, while during 1943 and 1944 the most frequent me thods were pressure dressings or casts, dry or with a bland ointment Morphine was usually given two or three times in the first 36 hours. in doses of 14 grain for adults and correspond ingly smaller doces for children. In a small number of patients phenobarbital or pentobarbital were used for sedation Most patients with burns involving more than 10 per cent of the body surface received intravenous infu atons of citrated plasma or serum. The plasma contained dextrose in amounts varying from

10 to 17 grams for each unit of 250 cubic contimeters. Some contained merthiolate in a final concentration of 1 10 000 as a preserva tive Many patients received transfusions of type specific citrated whole blood A small open and contact make the property of patients received intravenous injections of a 25 per cent solution of human albumin. Thu also contained an organic mercurial 1 10 000 as a preservative Sodium lactate was given intravenously to some patients in the form of a molar aqueous solution and others were given sodium bi carbonate by the oral and intravenous routes.

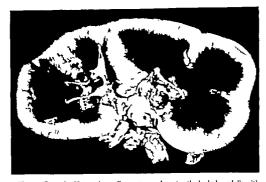


Fig. 1. Case 18. Note pale swollen cortex and contrastingly dark medulla with dark lines converging toward papillac. These lines in fresh tissue are black and histologically prove to be tubules containing blood pigment casts.

Intravenous glucose and isotonic salt solutions were also given to most of the patients.

In the evaluation of kidney function the following signs were considered to constitute evidence of lasting impairment-persistent azotemia with a level of nonprotein nitrogen exceeding 40 milligrams per 100 cubic centimeters of blood and oliguria or anuria per sisting beyond the period of shock. Periods of transient azotemia and oliguria occurring only during the period of shock or terminally or associated primarily with heart failure were not considered evidence of lasting renal dysfunction due to the burn The plasma non protein nitrogen total protein and albumin determinations were carried out by the routine methods as given by Peters and Van Slyke In patients receiving sulfonamides (chiefly sulfadiazine) the blood levels of the drug were determined at regular intervals Hemoglobi nemia was detected by examination of the supernatant plasma in the hematocrit tube The icterus index was estimated by the method of Murphy

Hemoglobinum was detected by the red or dark red appearance of the urme in the absence of gross hematuria. In most cases the diagnosis was confirmed by a gualac or benzidine test. In some cases the qualitative reaction for detection of hemosiderin with ammonium sulfide was carried out. The urine was usually tested for acidity or alka linity by litmus paper but occasionally more accurate estimation was made with nitrazine paper.

Shock was recognized by the usual clinical criteria of fall in blood pressure rapid thready pulse clammy extremities. An attempt was made to grade the severity of shock according to intensity and duration. The following criteria and qualifications were used for grading o patients who were never in shock for a period not exceeding 1 hour 2 patients who were in shock from 1 to 4 hours 3 patients who were in shock for longer than 4 hours or were in shock on more than one occasion. This last group includes also all patients who died in shock.

Morphologic examination of the kidney was done on sections fixed with Zenker's fluid and formalin and stained with phloxine methylene blue Lee-Brown modification, of Mallory's anline blue stain sudan IV for fat and a modified van Giesen stain for hemoglobin described by Dunn and Thompson With this last method hemoglobin casts in the kidney stain varying shades of green In our

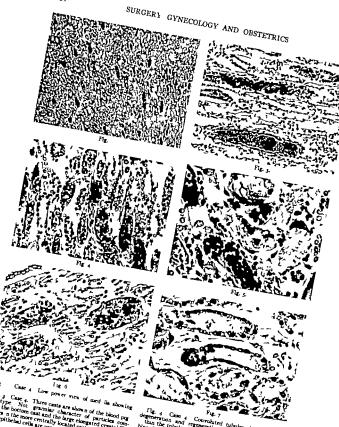


Fig. 3 Case 4. There can are also n of the blood pag mount type. Not. Framing character of particle com-pensing the bottom Cast and the farter of particle com-counting a the mount amount of particle com-mitted as the mount amount of the bound of an allowing the distance. practing toe boxton cast and the same compared crystal-are particles in the more centrally located cast. A few despute control of the control fig. (use 4 Corrolated tabules also extreme experience) and representing publishin. The determ that the tabules stain red, the representation. The determ for (phierales coethyrine blow) The Carpenting for the control of the Carpenting for th particles in the more centurally sociated uses. A new anterdepthebal cells are present in the upper case. Convoluted tubules also extensive

big (phanic coethylene big) the regression op-tical relia are flattered against the improvement op-and set in dark). A mitotic figure is present in upper left quadrant of field. (Legands come uned on followi & page)

sections casts or portions of casts composed of desquarmated tubule cell debris stained red Benzidine methods of demonstrating hemoglobin were with few exceptions unsatis factory, possibly because of long fixation in

A number of patients who were burned in the Cocoanut Grove fire are included in this formalin report. In some of these cases it was a m possible to secure all the desired data. How ever no patient in whom the essential clinical and inboratory data are lacking has been ıncluded

### OBSERVATIONS

# Renul Morphological Changes

Twenty of the 47 patients showed definite morphologic changes in the kidney at autopsy In 2 cases the renal lesion was acute pyelone phritis, entirely different from the lesions in the 18 other patients. In these latter pa tients the changes were all similar and consisted chiefly of the presence of tubular casts and degeneration and necrosis of the tubular epithelium (Figs. 1 to 7)

I Tubular casts Tubular casts were found in all 18 cases and were made up of (1) pig ment, and (2) desquamated epithelial cells. A maximum of 50 per low power field were found (Fig 2) Casts composed largely or exclusively of pigment were most numerous. Casts composed entirely of epithelial cells were rare Morphologically the pigment casts had a fine or moderately coarsely gran Most often the granules were approximately the size of red ular structure (Fig 3) crystal like green or blue cast particles were blood cells, or smaller

sometimes found The color with phlorine methylene blue stain varied from red to orange, brown green and blue The blue color was most frequent although all the other colors usually could be seen in a single section A positive staining reaction for hemoglobin in the casts was observed in all 17 cases in which this procedure was carried out. These casts were observed exclusively in the ascending and descending portions of the loops of Henle and in the collecting tubules. number was found in the medulla (Fig 2) although some could also be seen in the cortex Identification of the tubule involved was impossible in some instances because of the presence of degenerated epithelium adjacent to a cast. The epithelial casts were made up of necrotic tubular epithelial cells, although pigment particles were usually present also (Fig 6) These casts usually were acidophilic with phloxine methylene blue stain stained by the method of Dunn and Thomp-

son for hemoglobin the cell debris stained red and the particles of pigment when present green The staining reaction and the very fine granularity of the cell debris were similar to that of the cytoplasm of easily identifiable intact degenerated epithelial cells In an occasional cast infiltrating monocytes and polymorphonuclear leucocytes were seen Fibrin deposits in tubules were small and rare 2 Degeneration and necrosis of renal tubules

This change was found in two sites, i.e. in convoluted tubules and about casts lying within distal portions of the tubules. The degeneration and necrosis in these two sites seem to be distinctly different.

Necrosis and degeneration of convoluted tubules was found in 7 of the 18 patients. The cells were swollen pale and granular In some instances the cytoplasm was vacuolated in others the cells were partially or com pletely disintegrated so that individual cells could not be defined and the lumens of the tubules were filled with disintegrated cells (Figs 4 5 7). The nuclei were often pyknotic or absent. There was no correlation between the number of pigment casts and the extent of tubular necrosis. In each instance the kid neys described as having tubule necrosis or degeneration also showed indirect evidence of

Fig. 5. Case 4. A large mitodic figure in a regenerating convoluted tibule is abown in the central part of the field. currungers those a moon in the central part of the next.

The tubule at the right of the field above almost complete.

It is a complete to the field above almost complete.

The A complete to the field above almost complete. so of epithelium with amorphous deurs mining the language of epithelium with amorphous deurs mining and epithelium with amorphous deurs mining and blood pigment granules. The cell

mated cell delets and blood pigment granules. The cell delatis components are the large, rounded, dark bodies (red delatis components are the large, rounded, dark bodies (red no blooding-methylene blue sections and in sections stained for hemoglobin). Blood pigment particles are smallered less dark bronders green or bite in photomic-methylene blue used ark through green or bite in photomic-methylene blue sea dark bronders green or bite in the composition. Note also local damage to tubeles containing the casts. sections and gramme to tubules containing the casts.

and social unmage to undues containing the casta.

If a Case 9. Convoluted tubules showing degeners.

If a case 9. Convoluted tubules showing degeners,

recently represented exhibition. There is a mittoile figure

at the primary left of this points. at the extreme left of this tubule.

the antemortem nature of the changes by the presence of one or more of the following-regenerating epithelium mitote figures indicative of tubular regeneration and casts in the datal portion of the tubules composed of descummated negative initialist cells.

Tubular necrosis adjacent to casts were seen in 12 cases. The necrosis was limited to the cells surrounding casts. The cells were not swellen, pale or granular but were deeply compositile. Nuclei were pyknotic or absent In many instances the cells had become separated from the basement membrane and incorporated into the cast About some casts no cells were seen and only the basement resolvance of the tubules pressured.

3 Regeneration of epithelium Regenerating epithelium was found in 7 cases. Its presence is indicative of repair of tubular necrosis. In some cases necrosis was demonstrable along with regeneration. In others, actual necrotic

cells were no longer present.

Regenerating epithelial cells in the presence of necrotic cells were flat and basophilic lying against the basement membrane. In contrast, the cosinophilic, pale, granular necrotic cells often overland the regenerating cells (Figs. 4,5). Mitotic figures were usually not nu merous (Figs. 4,5,7). Cells with mitotic figures were usually large cells which protruded prominently into the lumen (Fig. 5). In tubules winch were composed entirely of recently regenerated epithelium and from which the necrotic cells had disappeared, the lumen appeared large because of the flat lining epithelium (Fig. 7). Mitotic figures in these less actively regenerating tubules were lever

4 Gross pathological changer. In contrast to the microscopic examination gross examination of the kidney revealed abnormalities in only 5 cases. In 3 cases the medulla had adrik red appearance and presented prominent black, brown, or purple-red streaks converging toward the papillac. The dark streaks in the pyramids correspond to the tubules filled with pigment casts. In 4 cases the cortex and the zone of the medulla included between the pyramids were definitely paler and more swellen than normal (Fig. 1). This appearance was considered due to the inbulled descentation. In 2 cases, the kidney

weights were significantly higher than normal whereas in all other cases the weight of the kidneys approximated the upper limit of the normal value or was only alightly increased. In 2 cases unidentified orange crystals were seen. Small areas of hemorrhage were seen in the mucosa of the pelvis in 4 cases. In 1 case a similar area of hemorrhage was observed beseath the mucosa of the ureter

5 Classification of the patients according to the morphological changes. For the numore of analysis, the 42 patients are divided into two groups on the basis of the autopsy findings. Group I comprises those in whom definite morphologic abnormalities were found in the kidneys while Group 2 is made up of those in whom no definite anatomical changes were found in the kidneys. Group 1 is composed of 20 patients and group 2 of 27 patients. Three patients in group a who died within 6 hours after injury are considered senarately since they differed markedly from the others in extent of deep hurn, severity of shock, clinical course, and early death. Two patients in croup a are also considered apart since the morphologic abnormalities observed in their kidneys were probably not directly related to the burn. In both of these patients the renal lesion was that of acute nvelonenhrits and was different from the renal lexions observed in the other 18 cases in group 1

In the following discussion, the patients in group I (with the exception of a patients) will be contrasted with the 24 patients in group 2 who survived longer than 6 hours following

injury

#### Read Function

A striking contrast between the two groups appears when the renal function is considered. The elevation of nonprotein nitrogen was higher in group 1 than in group 2. Two group 1 cases had nonprotein nitrogen levels above 150 milligrams per 100 cubic centumeters and 7 others had levels above 80. In group 2 only 3 patients had levels as high as 80. The high elevation was more constant in group 1 things of the former cases on which data are available had an elevated level commencing abortly after injury and persisting to death. Among the

group 2 cases, 15 of the 24 patients had an elevation at any time and 3 of these elevations occurred late in the course In most of the remaining group 2 patients the elevation decreased to normal before death after an early elevation

Oliguna of a persistent nature was pres ent in 7 of 11 patients of group 1 surviving longer than 2 days. All patients in this group who died within 48 hours also had oliguria. In contrast oliguria was observed in 6 pa tuents of group 2 and in 5 of them it was limited to the period of shock. In the sixth patient the oliguria was associated with cardiac failure

Examination of the incomplete data on specific gravity of the urine does not show a clear correlation between the amount of retention of nonprotein nitrogen in the blood and the ability of the kidney to concentrate or dilute urine.

A comparison of the amounts of nitrogen excreted in the urine by the patients of the two groups is difficult because determinations of daily urmary nitrogen were not carried out in all cases and because of the differences in ime of survival after injury between the two groups of patients. However the available data suggest that there was, on the average a higher output of urinary nitrogen in patients of group 2 than in patients of group 1 This is rendered more significant by the fact described above that the blood nonprotein nitrogen level was more elevated in group I than in group 2 Data on urinary nitrogen as compared to the blood levels of nonprotein nitrogen in 2 of our cases illustrate this point.

Urine reaction Eleven of 13 patients in group I on whom the initial reaction of the urine was tested had acid urine In the 2 other cases, it was neutral Two had alkaline urines subsequently in the first 24 hours. In group 2 the initial reaction of the urine was tested in 13 patients and found acid in all except 3 It was alkaline in 2 cases and neu tral in the third Subsequent samples of

urine were acid in most cases. Other findings in the urine. Granular and hyaline casts were found in the urine of 9 patients in group 1 and 4 in group 2 Protein was present in significant amounts in the

urine of 15 patients in group 1 and in 12 pa tients in group 2 Significant numbers of red and white cells were found occasionally in the urine of 13 patients and repeatedly in the urine of 5 patients in group 1 patients in group 2 had white and red blood cells in the urine on one or more occasions Peripheral edema was observed in 8 cases

in group 1 and in 4 cases in group 2

Age Sex Surface Treatment and Fever

There were no essential differences between the patients in both groups in regard to age sex and surface treatment. The ages varied from I year to 78 years. The sexes were equally divided Dry gauze or petroleum jelly pressure dressings were the most frequent form of surface dressing Four patients in each group were treated with triple dye Four patients in group 1 and 2 in group 2 were treated by the application of tannic acid and silver nitrate. All patients had fever at some time during the course of their illness. There was no significant difference between the two groups as iar as number of patients with fever and intensity of the pyrexia are concerned

### Other Observations

Hypoproleinemia Eleven patients in group 1 and 17 in group 2 had hypoproteinemia at some time during their hospital course almost all the fraction of the plasma protein most lowered was the albumin fraction

Surface area burned In general the patients in group 1 had more extensive burns than did the patients in group 2 In group 1 10 pa tients had 50 per cent or more of the body surface burned while only 3 patients in group 2 had burns of this extent. This marked contrast is also apparent when the extent of deep burn is compared in both groups. Thus, in 12 patients in group 1 the extent of deep burn was 35 per cent or greater of the body surface while in only 4 patients of group 2 was the deep burn of this extent. One patient in group 1 had a conspicuously small burn

Respiratory damage Many patients in each group suffered respiratory damage from in halation of hot air and smoke Very severe grade 4 respiratory damage was sustained by 4 patients in each group

Hemoglobiascum and hemoglobiasura. Hemoglobiaemia was observed in all cases of group 1 in whom the determination was done and issted from 1 to 4 days after the burn. It was observed to a leaser degree in 4 pa tients in group 2 Six patients in this group did not have be moglobinemia. Twelve of the 16 patients in group 1 on whom data are available had hemoglobinuria while only 1 patient in group 2 had hemoglobinura. Hemoglobia casts were seen in the urine of 3 patients in group 7 and in none in group 2 patients in group 7 and 1 none in group 2 patients in group 7 and 1 none in group 2 patients in group 7 and 1 none in group 2

Hemoconcentration During the first 24 hours hemoconcentration was observed in twelve patients in group 1 and in 16 in group 2

Shock Sixteen patients in group 1 and 12 patients in group 2 had clinical shock at some time during the first 36 hours. However the seventy and duration of shock was greater in group 1 than in group 2 Grade 3 shock was observed in 11 cases in group 1 and in only 3 cases in group 2 It should be pointed out, however that 2 patients in group 1 ind no shock and 1 had mild shock

Plasma and serum. The quantity of plasma and serum given was, on the average higher in patients of group 1 than in patients of group 2 the average in group 1 being 29 liters the average in group 2 t.8 liters in the first 48 hours. Most of the plasma was given in the first 14 hours.

Albumis in the form of a 25 per cent solution was given during the first 48 hours to 5 patients in group 1 and to 4 patients in group 2. It was given later to 3 group 1 patients and to 1 group 2 patient.

Mercury The plasma serum and albumin used early in the study contained an organic mercural preservative and some of the patients received enough plasma in relation to their body weight in the first 24 hours to raise the question of mercury toxnoty. However 7 patients in group r received fluids without mercury

Physiological saline in variable quantities was given parenterally to most patients in both groups. The average amount given during the first 48 hours was 19 liters in group 1 and 15 liters in group 2 and 25 liters in group 2.

Parenteral glucose solution 5 or 10 per cent was given to practically all patients in both groups. The average amount given in the first 48 hours was 10 liters in each group

Blood transfusion: Eight patients in group 1 and 10 patients in group 2 received type specific blood transfusions during their course. There was no evidence of a hemolytic transfusion reaction in any patient. Furthermore, there were 10 patients in group 1 who did not receive blood.

Drug therapy. Six patients in group 1 and 18 in group 2 received sulfadruga. This was sulfadiazine in most cases, 3 patients in civing sulfathiazole. Drug levels in the blood were markedly elevated in 1 cases and mod crately elevated in 2 cases in group 1 They were moderately elevated in 4 cases in group 2 group 2.

Sulfadrug crystals in the urine were found repeatedly in 1 case and on 1 occasion in one other case in group 1. They were found re peatedly in 3 cases in group 2. In no instance was this accompanied by agnificant hematurus. There were 7 patients in group 1 who received neither blood transitusions nor sulfonamides, and there were 2 patients who received neither blood transfusions, sulfona

mides nor mercury

Sodium lactate or bicarbonate was given on
entry to 12 patients of group 1 and to 14
patients in group 2:

Districts: Ammophylline, so per cent given cose solution or both were given intravenously to a number of patients in each group. The glucose solution was given in 4 cases and aminophylline in 12 cases, 12 in group 1 and 9 in group 2. In most cases the ambophylline was given for bronchial spasm and not as a diuretic. There was no evidence that the hypertonic glucose solution or the aminophyline had any significant duretic effect in these cases. Albumin was given for possible duretic action to 3 group 1 patients. In 1 of these it seemed to have a definite diuretic action (see Case 4 report) while in the 2 others of effect was observed (see Case 2 report).

Complications and time of death. The most promps of patients were of a pulmonary nature. Pneumonia, bronchopneumonia, and pui monary congestion occurred in about one-ball of the patients in each group. Other complications were atelectasis of the lung in 2 cases pyrogenic plasma reaction in 2 cases, the latter having received grossly contaminated plasma acute hemorrhagic cystitis in 5 cases cerebral edema in 3 cases, and central necrosss of the liver in I case

On the whole the patients in group 1 died earlier than did the patients in group 2 The cause of death was variable. In many cases the injury to the respiratory tract was the chuef cause of death In some death was due to the complications noted above (chiefly pneumonia) but in some cases it was im possible to state what the patient died of more specifically than extensive burns Two pa tients in group 1 died of shock due to burn In only 2 cases could kidney failure be con sidered the chief cause of death

Patients with acute pyelonephritis As was stated before, 2 patients in group 1 are considered separately since although the kidneys in these 2 patients were abnormal morphologically the anatomical lesion was quite different from that observed in the 18 other patients in group 1 The renal lesion in these 2 patients was that of acute pyelonephritis. Both were in shock and had hemo-Patient 16 in globinemia on admission addition had hemoglobinuria Patient 3 had been on constant bladder drainage from the time of admission to death.

Patients in group 2 who died within 6 hours after burn Three patients in group 2 are also considered separately since they differed so much clinically from the remaining patients in this group All 3 had extensive deep burns and respiratory tract injury They were all in profound shock and had marked hemoglobi nemia One was completely anuric while the 2 others excreted a very small quantity of acid urine containing hemoglobin. The non protein nitrogen level in the blood was elevated on admission in 1 patient and normal in 2 patients. All 3 patients died within 6 hours after admission 2 (Cases 21 23) of shock and 1 (Case 22) of asphyriation None showed any renal changes at autopsy

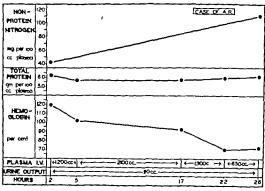
### CASE REPORTS

CARE 20 Extensive deep burns hemoglobinuria shock oligaria atotemia and marked renal changes at

antopyy This 9 year old boy with a noncontributory past history was admitted shortly after receiving deep flame burns of almost his entire body Exam ination revealed a well developed and well nourished boy in moderate distress The total burned area was about 90 per cent Most of the areas appeared to be The skin was hard leathery and brown with very little external coze. Areas were clean The chest was clear throughout The pulse was 100 of good quality blood pressure 110/70 and the

Under morphine sedation 1/13 grain, petrolatum respirations 20. pressure dreasings were applied to all areas except the abdomen which was treated with triple dye By the end of the dressing the patient had received 200 cubic centimeters of plasma containing 20 cubic centi meters of molar lactate He was definitely in shock at this time The pulse was very rapid and thready the feet hands and face (which were the only exposed areas) were cyanotic and cold Plasma was forced in by syringe, 450 cubic centimeters being given in 10 minutes. There was immediate improve ment in the circulation He was catheterized at this time and a small amount of dark brown acid urine was obtained He was left on constant bladder drainage. He was given sodium bicarbonate one half gram by mouth During the next 12 hours the patient received about 2500 to 3000 cubic centi meters more of plasma and 20 cubic centimeters of molar sodium lactate He took only a small amount of water by mouth and vomited as soon as any fluid was taken His pulse varied from 100 to 140 The blood pressure could not be taken because the ex tremities were in dressings. The temperature rose to 104 degrees rectally at 14 hours and exposed areas were sponged with cold alcohol He became stupor ous and the pulse was barely perceptible. Five hundred cubic centumeters of plasma and Sigram of sodlum blearbonate was given rapidly in 10 minutes by syringe with definite improvement in the quality of the pulse Shortly thereafter he began having generalized twitchings and clonic movements each convulsive episode lasting about 5 minutes. Lu minal in 2 grain doses was given intramuscularly The temperature rose to 107 degrees and pulse to 150 and was weak. He remained comatose and died 26 hours after entry He had received a total of 4800 cubic centimeters of plasma intravenously. His total output was 90 cubic centimeters of very dark

Laboratory data The hemoglobin total protein and nonprotein nitrogen data are given in Chart I brown urine There was moderate hemoconcentration on entry which was corrected by the plasma infusions plasma protein concentration remained within normal range The nonprotein nitrogen rose rapidly from a high normal value to over 100 milligrams. Hemoglobinemia was marked Analysis of the first urine specimens revealed a dark brown acid urine specific gravity 1 030 with no acctone, bile or sugar It continued to be dark brown or black. amount of proteinura increased progressively from



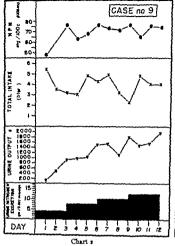
Chart

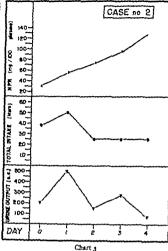
a slight trace to a very heavy trace. The sediment revealed granular casts and y t no red blood cells. The benaldine and bemosiderin stains were positive.

Interry findings B rms covered 90 per cent of the body surface and were chiefly deep. The lungs were congested a d edematons with partial atelectasis of the lower lobes. The combined weight of the kidneys was 160 grams. The cut surface revealed a slightly redder than normal cortex and medulla with minute red streakings converging at the papillae Microscopic examination revealed that the glomer ular spaces contained dark blue granular precipitate. The same precipitate was found in most tubules. There was no modification of the basement membrane of the tufts and no cellular infiltration or endothelial or epithelial hyperplasia. The tubules contained numerous pigment casts. Flity casts were counted in a single low power field (100×) in the medulla. The casts were found in the descending limbs of Henle's loop and collecting tubules. Most of the casts were composed of red granules. Some, however, were brown others blue The particles ranged from fine granules to larger round masses. Most cast particules gave a positive stain (green) for hemorlobin. Mononuclear crils with cosinophilic cytoplasm and pyknotic nuclei were en countered occasionally within the casts. cytoplasm of these cells stained red with hemoglobin stain. The convoluted tubular changes were marked and except for the absence of regenerating epithelium were klentical with that seen in the kidneys of Case 12 There were areas where the nuclei were completely missing and the cells were granular and had filled the tubular lumen with amorphous masses of cytoplasm. There did not appear to be any interatitial edema. There was no leucocytic infiltration. There was no congestion of interatitial vessels.

CARE : Minimal surf ce burn ma ked respiratory trect i jury, no shock totemie and renal chauges at autopry This 43 year old woman received burns at the Cocoanut Grove fire She had inhaled a considerable amount of hot smoke and had lost con sciousness. The past history was not obtained Examination revealed a fairly well developed and well nourshed woman. She was unconscious. She had marked strider dyspnes, and cyanosis. The only external burn was a small area on her nose. The pulse was rapid. During the first 24 hours she received 1000 cubic centimeters of plasma, 1500 cubic centimeters of saline and 1000 cubic centi meters of elucose in water No data are available as to the urine output on the first day. On the second day 500 cubic centimeters of dark urine was passed and on the third day 300 cubic contineters. At the end of a hours because of increasing respiratory distress, a tracheotomy was performed. respirations improved markedly for a brief period. On the third day sulfadiasine was started. The respirations continued to be labored with coarse rales throughout both lung fields. The patient died on the fourth day following a midden increase in respiratory distress.

Laboratory data. On the second day the hemoglobin was 90 per cent and the nonprotein nitrogen





was 94 milligrams per 100 cubic centimeters of plasms. The urine was dark in color with a slight trace of albumin and no sugar or accione. There were 0-2 white blood cells and no casts.

wete or white blood cells and no casts.

Autopry finding: The following were noted a burn dermal, of nose acute laryingo tracheobron chitis (inhalation) congestion of the spicen and liver, bronchopneumonia and edema of the lungs The kidneys together weighed 310 grams. The pale gray plak cut surface of the cortex was clearly demarcated from the deeper stained red-blue pyra mids Microscopic revealed glomerular capsular spaces contained a moderately heavy precipitate. The same precipitate was found also in all tubules Otherwise there was no glomerular change. The capillaries contained blood no thrombi were present There was no modification of the basement mem-There was no endothellal or epithelial cell hyperplasis or inflammatory cell infiltration. The tubules contained casts and showed some damage to the tubular epithelium The casts were found in the tubules of the medulia and less often in tubules of the cortex. The epithelium was so modified in the portions containing casts that it was not always possible to klentify the type of tubule. Collecting tubules and ascending limbs of Henle's loop were recognized in a few instances. The casts were for the most part composed of densely packed fine base-

philic granules There was a brown to red color to some casts. Part of some casts were pale blue and homogenously smooth An occasional cast was composed of larger bright red globular particles. With hemoglobin stains there were many casts of green particles and others of red Recognisable desquamated cells presented red cytoplasm and nyknotic nuclei It should be mentioned that here as in other cases the nonpigment casts stained red and were cell débris la origin. Tubular necrosis was slight and seen most prominently in those portions containing casts. In places only the basement membrane remained elsewhere the epithelium was reduced to very flat cells. The tubular cells gur rounding casts were flattened the cytoplasm deeply cosinophilic and the nuclei pyknotic others had fallen away from the basement membrane seeming to become part of the cast. The convoluted tubules gave the impression of being dilated there being a considerably greater sized lumen than is usual. The cells were low and granular, and many cells con tained no nucles Regenerating epithelium growing beneath degenerated cells was seen only rarely A very rare mitotic figure was found. There was no cel iular infiltration of interstitial tissue and no scars. Capsules, arterioles and pelves were not remarkable.

CASE 9 Extensive deep burn shock hemoglobinurla asotemia transient oligaria impaired urinary

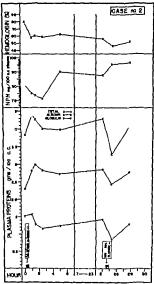


Chart 4

nitrogen excretion and natichanges at utopsy A 19 year old woman with a noncontributory past history received burns over 45 per cent of the body surface, chiefly deep and respiratory tract injury at the Coccanut Grove fire. Initial surface treatment was triple dye following sosp and water cleansing Pulse on entry was weak and rapid. In the first \$4 bours she received is units of plasma, a liters of saline and 116 liters of glucose in water She took Soo cubic centimeters of water by mouth. Her circulation improved over a period of hours and there were no further episodes of peripheral collapse. The urine output was 200 cubic centimeters in the first day and thereafter over a liter dally Sulfadia zine was begun on the third day The free drug level rose to 14 milligrams per 100 cubic centimeters of blood and the total drug level to 18 milligrams per

soo cubic continuctors of blood on the fifth day Thereafter, the sulfadishine was given intermit tently with levels being obtained as given below under laboratory data. On the seventh day the temperature which had been on to soo degrees rose remaining at about roy degrees thereafter. She became markedly dyspreke and there were diffuse musical and crepitant risis throughout the entire chest. Polmonary algus and symptoms increased and the patient expired on the twelfth day

total." Thereafter the drug levels ranged from y a milligrams free" and at on milligrams 'total." The plasma total protein concentration was quarm per soo cubic centimeters of plasma on the farst day with a normal sibumin/globulin ratio. Thereafter the total protein ranged from 4.10 C.1 the normal sibumin/globulin ratio continuing normal. The urine ultrogen exerction rose from a grams daily during the first y days to 10 grams daily from the inith to twelfth day. Urine at the 16th hour dark brown hemoglobin 80 milligrams per 100 cubic centimeters #1.5.1 specific gravity 1010 albumin slight, trace bemoglobin casts hemosabrin, a plus. Thereafter the specific gravity ranged from 1013 to 1017 and the sediment showed an occasional red and white blood cell.

The following were noted Autopsy findings burns covered 45 per cent of the body surface, chiefly deep acute laryngotracheobronchitts (mbronchopneumonia. The kidneys tohalation) gether weighed 310 grams. The cortex was pale and somewhat swollen. Microscopic showed the glomer uli were not remarkable save for vacuolated pink precipitates within the capsular space. The tubules contained casts of the two general varieties and presented evidence of tubular degeneration. The pigment casts were composed of granules varying from brown to red with an occasional smooth, blue homogenous irregular mass. The other casts were composed of cellular débris which was cosmophilic and granular Faint outlines of cells with uclei were present in these casts. There were less casts of this type than there were pigment casts. Casts were not numerous. Usually a maximum of three casts per low power field ( oo X) could be seen Casts were found in the collecting tubules and loops of Henle Desquamated degenerated cells were present within the lumen of the tubules but regenerated epithellum was the predominant feature indicating previous tubule damage. Identification of the tubules involved in this process was often impossible

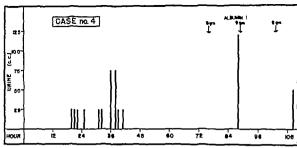
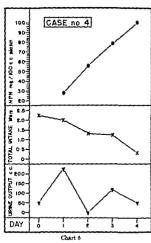


Chart 5

It appeared that the convoluted tubules and possibly ascending limbs of Henle's loop were affected The regenerated epithelium was not as high as was the older epithelium and took a distinctly more basophilic stain Mitotic figures could be seen oc casionally, indicating that the process was still active. The interstitial tissue was very edematous Tubules were widely separated by pale loose stroma and between glomerular capsules and tubules there were widened clear areas. In a few areas newly formed fibroblastic tissue was present in the loose edematous stroma. In more or less discrete patches there was a moderate infiltration with plasma cells and a lesser number of lymphocytes. Only a rare polymorphonuclear leucocyte was found bules were found containing polymorphonuclear leucocytes. It is not possible to say that the inter stitial reaction bore any anatomical relationship to degenerated tubules or tubules with casts. Several large veins contained thrombi partially filling the lumen. These thrombi were composed of fibrin, enmeshed leucocytes, red blood cells and a red granular substance of undetermined nature. In the fargest veins fibroblasts were invading the thrombifrom points of attachment The surrounding inter stitual tissue contained plasma cells and newly formed fibroblasts,

CARE a Extense deep burns shock hemoglo binario astormia oligarno edema and marked vanal changes at audopty. No disarcic effect from 50 per cent glucose or 25 per cent albumin infravenously. This so year old white female with a noncontributory past history received flame burns about 6 hours before entry as a result of an oll stove explosion. She felt fairly well at home and entered because of per sistent pain. Examination revealed a fairly well developed and nourished woman with mixed dermal and deep burns of 30 per cent of her body surface. The blood pressure was 70/40 the pulse rapid and thready. Morphine 1/2 grain was given subcutane county and plasma started intravenously and within oursily and within

the next 2 hours 1000 cubic centimeters of plasma and 800 cubic centimeters of 5 per cent glucose in saline were given intravenously Her blood pressure rose rapidly to 120/80 and her pulse lell to 94 and was of good quality. The burns were then washed and affiver nitrate and tannic acid were applied. In the next 8 hours her blood pressure gradually fell and the pulse rose to 140 and was of poor quality patient was given 1200 cubic centimeters of plasma in a hours with a rese in blood pressure and a fall in the pulse resulting and for the rest of the day her pulse remained about 100 and was of good quality The blood pressure rose steadily reaching a level of 190/110 about 30 hours after entry but in the next 8 hours it had dropped to 130/90 There were no further episodes of hypotension or hypertension. The output was 200 cubic centimeters in the first 24 hours Her hemoglobin fell from a level of 96 per cent on entry to 60 per cent in 48 hours. One thou sand cubic centimeters of blood was given in the next 2 days but the hemoglobin remained about 60 per cent. Small petechiae were evident over the abdomen at 36 hours. The platelet count at this time was 18 000. The petechiae gradually increased until the entire abdomen and chest were covered In the next 36 hours generalized edema became evident. This edema increased during the next day and then gradually disappeared with no evident diuresis or evidence of fluid accumulation in either the thorax or abdomen The patient had been given aminophyllin at 30 hours and again at 40 hours with no apparent divress being obtained output remained low throughout the course and the plasma nonprotein nitrogen rose from 30 milligrams per 100 cubic centimeters plasms on entry to 130 on the fourth day (see Chart 3) Concentrated albumin and 50 per cent glucose were given on the second day and third day without producing any diuresis. From examination of Chart 4 it may be seen that 200 cubic centimeters of 25 per cent albumin intravenously produced a somewhat greater apparent increase in



blood volume as judged by the serial hemoglobin determinations, than 100 cubic centimeters of to per cent glacone. In the farmer instance the plasma protein concentration rose from 3.5 to 4.4, the rise being due to an increase in the albumin fraction, while in the latter case plasma protein fell from 4.5 to 3.5. The temperature had rise no 100 degrees on the second day at which level it remained. The pulse and respirations rose gradually beginning on the fourth day and the patient became urrational and stomorous and eroticed on the fifth day.

suitery satisfic Burns involved 35 per cent of the body surface chickly deep Petcchial hemorhages of the skin I testinal tract myocs dium, recal pelvis and ureter were noted Patient had theumatic heart disease, inactive minimal bilateral hydrothorax 750 cubic continuents pulmonary odema, peripheral edema (feet legs genitalia). The conditioned weight of the kitdneys was 300 grans. On the cut surface and in the pelves were found many minute yellow crystals which could be scraped in diameter). In diameter, in cach kitdney. The pelves therefore marked submoosal kenominate. Along the understhese were many peterbiase. Cortex and medifical were well demarkated.

revealed that the glomerular capsular space con tained a small amount of fine pink granular precioi-The tufts showed no modification of the basement membrane, no cellular proliferation of infiltration, and the capillaries showed no convertion or thromboels The tubules contained moderate numbers of casts. These are most numerous in the medullary regions. A maximum of so not low none field were counted. The casts are composed of appreciates of red to blue fine erapules minuted with which were small amorphous blue mesors and a few desquamated cells (phloring methylene bine). The majority of tubules containing casts could not be majority of tubules containing casts could not be identified but an occasional collecting tubule, ascending and rarely descending limbs of loop of Henle were identified as containing casts. Rarely an intact tubule was found packed with cells. These cells aften appeared to be macrophages containing yellow to red grapules. In other instances there were cells with the appearance of descuemated enthelium. In a instances a few polymorphonuclears surrounded the casts. In Zenker fixed tissue stained for bemoslobin, the larger particles were olive erren in contrast to the red stain taken by descuamated cell débris. Degenerative changes of tubular epithelium was not definitely found except at the sites of casts. However mitotic figures and regenerated epithelium and the finding of desonamated enithelial cells in casts was indicative of tubular damage Many tubules of the medulla contained numerous large vellow particles. The interstitial tissue contains small foci of lymphocytes. Arterioles were not remarkable.

CASE 4 Extensive hurns shock assignia ciena and renal changes at autobry Discretic effect f our 25 per cent album n intrasenously A 2 year old male infant with noncontributory past history entered the bospital as bours after receiving mixed dermal and deep hot water burns of 30 per cent of his body surface. Examination revealed a well developed and nourished anathetic infant. His color was ashen, extremities were cold and clammy pressure was unobtainable polse was rank and thready, rate about 160 and the peripheral veins were collapsed Petrolatum pressure dressings were applied with no preliminary cleansing. On entry plasma was begun intravenously to cubic centimeters being given in 3 minutes following which the patient's color improved the pulse became stronger the rate dropped to 13 and he began moving about The rat of plasma administration was allowed down and in the next so minutes ago cubic centimeters of plasma were given. The patient became pale less active and the pulse was weaker After the rate of administration of plasma was speeded up, the color and the quality of the pulse improved. During the next 5 hours he received 400 cubic centimeters of plasma and soo cubic centimeters of water by mouth, the quality of his puise and his color remaining good. About to hours after injury there was a brief period of peripheral collapse which responded t an increased rate of plasma flow

Shortly thereafter the patient voided for the first time to cubic centimeters of clear light vellow urine He was given 200 cubic centimeters of 5 per cent glucose in water intravenously in the next 2 hours Fifteen hours after the injury the patient had a generalized convulsion. The respirations became rapid and gasping. Cyanosis was marked the pulse very rapid and weak. The temperature was 104 degrees rectally. The patient quieted down in a few minutes but the pulse continued to be rapid and of poor quality. The neurological examination was negative Plasma was begun and after 150 cubic centimeters had run in his color improved and the pulse became slow and stronger. During the next 2 days the patient had a number of similar convulsive seizures despite fairly heavy sedation with sodium luminal. On the third day he had a much more prolonged seizure which lasted about 114 hours. The pulse and respirations became very weak and rapid Coramine and adrenalin were given intravenously with transitory improvement in pulse and respira tions Adrenaun was repeated twice more in the next half hour with the blood pressure rising to 110/80 at which level it remained thereafter. During the first 48 hours the patient received 2250 cubic cents meters of plasma 250 cubic centimeters of 5 per cent glucose in water intravenously 200 cubic centimeters of x per cent glucose in water by clysis and 1500 cubic centimeters of water by mouth. There was some abdominal distention at 15 hours and gastric lavage yielded 150 cubic centimeters of coffee ground material. In the next to hours there was an additional 250 cubic centimeters of similar material vomited The urine output was low during this time the total being 175 cubic centimeters in seven 25 cubic centimeter amounts in the period of 12 to 38 hours. In the next 30 hours the patient received 500 cubic centimeters of blood intravenously 850 cubic centimeters of water by mouth 100 cubic centimeters of 5 per cent glucose in water and 250 cubic centimeters of sodium chloride and sodium lactate solution Ammophyllin and mercupunn were also given intravenously. There was 200 cubic centimeters of vomitus and two liquid gualac negative stools. The patient had started to become no iceably edematous 48 hours after entry and this increased definitely in the next s hours. There had been no urine output for the last 32 hours. At this time 35 cubic centimeters of 25 per cent salt-free albumin was given intravenously (Chart 5). In the next few hours there was a definite reduction of cdema and some beginning bladder duliness which gradually increased. Nine hours later the patient was catheterized and 120 cubic centimeters of urine was obtained. At this time 35 cubic centimeters additional albumin was given. The following morn ing 200 cubic centimeters of 5 per cent glucose in water was given by clysus and 150 cubic centimeters of water was taken by mouth. The edema increased again and following the administration of 35 cubic centimeters more albumin there was some decrease in the edema. Two hundred and fifty cubic cents

meters of whole blood and 31/2 cubic centimeters of aminophyllin were given intravenously and 50 cubic centimeters more urine were obtained During this period the patient was having loose tarry stools. On the fifth day he became comatose and the neck was somewhat stiff Neurological examination was otherwise negative Lumbar puncture revealed clear fluid pressure 300. The patient remained comatose and about 414 days after entry the respira tions gradually increased the pulse became more rapid and weak, and the blood pressure was un obtainable. The respirations became suddenly markedly labored and the respirations and pulse stopped in a period of a few minutes. His nonprotein nitrogen which had been normal on the hist day rose to a level of 100 milligrams per 100 cubic centimeters of plasma shortly before death (Chart 6)

Autopsy findings The following were noted burns as per cent of the body surface mixed dermal and deep acute esophagitis (traumatic-inlying Levine tube) pulmonary edema pleural effusion and abdominal ascites (alight) The combined weight of the kudneys was 70 grams. The cut surface seemed swollen and appeared to bulge slightly. The pyramids were darker than usual Microscopic exami nation revealed the glomerular capillaries con gested the capsular space small and contained pink granular precipitate. There was no modification of the basement membrane or Bowman's capsule. The tubules contained numerous casts and showed extensive deceneration with marked regeneration of the epithelium. A maximum of 48 casts was counted in a single low power field (100X). The medullary region contained the greatest number of casts. The casts were of two main types i.e pigment casts and casts composed of desquamated tubule epithelial debres. The former were most commonly composed of moderately coarse granules of blue or dark green color The individual granules often were of ovold or round form. Less commonly the particles assumed larger rod like green forms. In some casts there were desquamated cellular elements. Pigment casts were found for the most part in collecting tubules or in the ascending portions of the loom of Henle Most of the casts give a positive staining reaction for hemoglobin The casts formed of desquamated necrotic cells were found in the cortex in convoluted tubules and in tubules that could not be identified because of extensive degeneration These casts were composed of brilliantly eosinophilic finely granular material. No nuclear material could be seen. In some instances there were no remaining viable epithelial cells so that the cast was bounded only by the basement membrane of the tubules. In other instances flat basophilic re generating epithelium was seen underlying the eosinophilic masses Mitotic figures were numerous in the regnerating cells. Regenerated cells completely replaced degenerated cells in some instances The tubules did not contain fat droplets of de generation. There was no cellular infiltration or

fibrous of the interstitial therees and no scarring Arterioles and renal pelves were not remarkable

DISCUSSION Observations on renal function and renal changes at autopsy in 47 patients have been described. The patients were separated for purposes of analysis into two groups on the basis of the morphological abnormalities of the kidneys. Group r included 20 patients (Nos. 1 20) in whom the kidneys at autopsy were abnormal. Group 2 included 27 patients whose kidneys were normal morphologically Two patients (Cases 3 and 16) in group 1 were considered separately because the renal lesson found at autopsy was an acute pyclonephritis, entirely different from the renal lesion observed in all other patients of this group In addition 3 patients in group 2 with extensive burns who died very early were considered separately It is possible that in these cases there was not time enough for the appearance of morphological changes that might have been expected from the severity of burn in these patients. These 5 patients are excluded from the following discussion.

The anatomical abnormalities described here in the kidney of 18 patients of group 1 vary in degree of intensity from one patient to the other but are homogeneous in the whole Pigmented casts, epithelial casts, tubular necrosis and tubular regeneration, in cases surviving more than 2 days. The pig ment casts were probably derived from blood pigments. This is indicated by the fact that they were indistinguishable from similar casts found in the kidneys of patients with hemolytic transfusion reactions, and is further confirmed by the presence of a positive staining reaction for hemoglobin in these casts. Furthermore there was a close correlation between the presence of hemoglobinuria during life and the presence of pigment casts

There was a close correlation between the clinical and laboratory findings of renal function and the pathologic observations on the kidneys. All patients in group I had evidence of persistent kidney dysfunction while only 1 patient in group 2 presented such evidence and in this patient it was secondary

to cardiac fallure In the few group 2 patients who had elevated levels of the blood non protein nitrogen, the levels were on the whole much lower than in group 1 patients. In addition the two highest levels recorded in group 2 (Cases 33,38) occurred late in contrast to the early high levels observed in group r There was also a contrast between the 2 groups of patients in respect to urme output. It is well known that during a period of shock of what ever cause there is a marked decrease in the output of urine (18) However in most patients in group I with oligura, this out lasted the period of shock and persisted until death while in all but one group 2 patient the oliguria was limited to the period of shock and in this patient the oliguria was associated with cardiac failure. In those patients of group 1 in whom the oliguria was transient there was evidence of impaired ability to clear nonprotein nitrogen products in the face of a urine output of a liter or more daily

A number of factors can readily be ruled out as responsible for the difference in renal changes in the two groups since these factors occurred with equal frequency in both groups. These are (1) age, (2) sex, (3) surface treat ment, (4) fever (5) plasma protein concentra tion, (6) fluid intake The intake of fluids was somewhat higher on the average in group i than in group 2 This is readily explained by the more extensive burns and higher frequency of shock in group 1 Since the shock in almost all the patients in group I was successfully treated it is probable that sufficient quantities of fluids were given so that their oliguria is not to be explained on the basis of insufficient fluid intake. The types and proportions of fluids given were the same in both groups. (7) Chemotherapy was not a determining factor since 12 patients in group 1 did not receive sulfadruga. In no instance was hemolysis seen as a complication of drug therapy (8) The organic mercurial preserva tive present in some of the plasma, scrum and albumin was not responsible for the production of the renal syndrome since equal numbers of patients in both groups received mercury free fluids and mercury containing fluids. (9) Blood transfusion. The possibility that the renal lesion was produced by hemolytic transfusion reactions can be ruled out since there were 8 patients in group 1 who did not receive blood at any time during their course, and in the remainder there was no evidence of a hemolytic reaction

The 2 groups of patients differed mainly in respect to the following factors (10) extent of burn and especially extent of deep burn (11) occurrence severity and duration of shock and (12) presence of hemoglobinuma.

Extent of burn The chief complications of burns such as toxemia progressive anemia and nutritional disorders are directly related to the extent of burn and particularly the extent of deep burn This holds true in regard to renal complications, since two-thirds of the patients with kidney dysfunction had deep burns of greater than 35 per cent body surface while only one-sixth of the patients without kidney dysfunction had burns of this severity One patient (Case 1) in group 1 had a very small surface burn but had very extensive respiratory tract damage. There were 3 other patients in group 1 and 4 in group 2 who also had severe respiratory tract damage. The problem of respiratory tract injury as a complication of thermal burns has been discussed elsewhere by Finland Davidson and Levenson

Shock As would be expected from the fact that the patients in group 1 were the most severely burned the occurrence of shock in this group of patients was more common and more severe and prolonged than in the patients in group 2 This difference is important since shock per se is known to have a profound effect on kidney function. The occurrence of oliguria during shock is well recognized and is presumably due to a markedly decreased blood flow through the kidney (18) The blood flow through the kidney may be reduced to as low as 5 per cent of its normal value during shock at a time when the general blood flow is only reduced to 50 per cent (18) That the renal failure observed in shock as sociated with burns may be different from that seen in other types of shock is suggested by the experiments of Olson and associates on dogs. They showed that in burn shock restoration of the blood pressure by infusions of saline did not increase the output of urine

while such infusions did increase the urinary output in hemorrhagic and tourniquet shock The effect of shock on renal function is related to the severity and duration of the shock Disturbances in renal function are more severe and more protracted when the shock is profound and lasting Irreversibility of the function and morphologic alterations of the kidneys following severe shock have been described by Van Slyke He showed that severe reduction in the renal blood flow during circulatory failure for a period of hours follow ing hemorrhage is often followed by markedly impaired kidney function and pathologic changes in the kidneys consisting chiefly in tubular necrosis and the presence of pigment casts in the tubules.

Hemolysis The third factor of apparent importance in the pathogenesis of the renal injury following burns is intravascular hemolysis, since renal injury has been observed in a number of other conditions in which intra vascular hemolysis occurs (2.7 21 28.32) In travascular hemolysis occurs in all severely burned patients and is apparently caused by a direct action of heat on the red cells of the blood circulating in the burned areas (23) Its occurrence and severity are directly related to the extent of deep burn and, as would be expected hemoglobinemia was greater in the patients in group I than in group 2 Hemoglobinuma was seen in nearly all the group I patients and in only I pa tient in group 2

Monke and Yuile in dogs and Altschule in men have demonstrated that hemoglobin is excreted in the urine only when the levels of free hemoglobin in the plasma reach values of about 150 milligrams per 100 cubic centimeters of plasma. Below this concentration it is apparently completely reabsorbed from the glomerular filtrate by the renal tubules. In chronic hemoglobinemia in dogs the threshold is lower which has been explained by a supposed saturation of the tubules with pigment derived from red cells (12) When hemoglobinemia is associated with shock the conditions for the appearance of hemoglobi nuria may be different. Absence of hemoglobinuria in the presence of a marked hemoglobinemia in such cases could be due to

the decreased glomerular filtration caused by the vascular hypotension and the decreased renal blood flow. Furthermore if anuris of whatever cause is present as was the case in one of our patients, and as has been reported by DeGowin it is obvious that no hemoglobinum can occur even in the presence of marked hemoglobinemis.

If the renal damage is a direct toxic effect of the products of intravascular honolysis it can be producted only if the products of red cell hemolysis reach the kidney tubules. This seems likely since in these cases hemoglobinuma and not merely hemoglobinemia is associated with renal leasons. On the other hand, it may be just a question of degree of hemoglobinemia, since hemoglobinemia was more marked in the patients with hemoglobinuma than in those without hemoglobinuma than in those without hemoglobinuma.

Renal injury sometimes of a severe nature is sometimes seen following hemolytic blood transfusion reactions. The renal syndrome of hemolytic transfusion reactions includes oli guria or anuria, azotemia and often uremia Morphologically the kidney changes such as pigmented casts in the tubules and tubular necrosis are strikingly similar to those seen in patients with severe burns. Here also as in the kidneys of burn patients, there is no apparent correlation between the number of casts and the extent of tubular necrosis (7) Other types of intravascular hemolysis have also been shown to affect the kidneys in a similar fashion. Renal failure has been de scribed in cases of paroxysmal nocturnal hemoglobinuria (21) hemoglobinuria due to quinine pousoning (28) black water fever (11) acute hemolytic anemia due to sulfonamides (12) and hemoglobinuria of obscure origin (2)

The mechanical obstruction which may be caused by the purment casts in the tubules seems quantitatively inadequate to explain the renal failure. It is possible that the tubular necrosis may play a part although the extent of tubular necrosis again does not seem sufficient to account for the failure. The sections of the kidney provide no information on the function of the glomeruli which may be impaired although their structure appears

normal. The identity of the substance or substances in hemolyzed blood which are responsible for the kidney injury and the mechanism of action are still debated. In dogs reduced hemoglobin and exphemoglobin do not appear to be toxic, while methemoglobin appears to be toxic in the presence of an acid urine. If the urine is alkaline methemoglobin is also nontoxic (4) It has been shown that when intravascular hemolysis occurs, part of the hemoglobin is oxidized to methe The application of these moglobin (27) observations to the cases studied here is obvious when one remembers that methemoglobin has been found in the blood and urme of burned patients (23 24) and that the initial urines of most burned patients are acid. It is also possible that the products of he molysis are particularly 'toxic kidneys of patients in shock. Under the tonditions of relative ischemia and anoxia, the kidney may be more susceptible to injury I uile and his associates have shown recently in experimental animals that renal injury by bemoglobin occurred only when the Lidney had been damaged previously. Another possibility is that some other constituent of the red blood cells set free during hemolysis, for instance the stroma, is toxic since solutions of hemoglobin are much less toxic than is hemo-

lyzed blood (13) The problem of the toxicity of hemolyzed blood is intimately linked with the question whether alkalinization of the urine is in any way preventative of renal damage question in relation to the kidney dysfunction in patients with burns cannot be solved on chnical grounds alone since practically all severely burned patients have an acid urme when they are admitted to the hospital and intravascular hemolysis has already existed for at least an hour before alkalinusation of the urine is attempted. No studies in animals comparable to those of Baker and Dodds on the effect of alkalinization on the renal dam age following hemolytic blood transfusion reaction have been made. The effect of alkalinusation of the urine after hemolysis has been present cannot be evaluated from the data reported here since despite the adminitration of alkali on entry the urines remained

acid during the first 12 hours in most patients Walker reported no benefit from early alka linization in his patients with burns

The renal syndrome of severe burns is similar to the renal syndrome associated with erush injuries. The urine in the latter syn drome, however contains myoglobin rather than hemoglobin and the pigmented tubular casts have also been shown to contain myoglobin (5) It is believed that the myoglobin originates from the crushed muscles. Idiopathic paralytic myoglobinuria which is rarely encountered in man but is occasionally seen in horses is also characterized by myoglobinemia and myoglobinuria and a clinical and pathologic renal picture entirely similar to that found after crush injury. Shen and Ham and Taylor and associates (24) have looked for myoglobin in the blood and urme of some burned patients but in no case was any found Kidney dysfunction and renal changes similar to those described here have also been reported following severe traumatic injuries (noncrush) with shock

The azotemia observed in this series of patients deserves special comment since it may be due in part, to an increased production of nonprotein nitrogen in the presence of a failing kidney. The very rapid rise in non protein nitrogen values observed is best explained by a factor of increased production together with decreased excretion. This view is further supported by the fact that there is an increased breakdown of proteins in burns (25).

Fartition studies of the nonprotein nitrogen products in the blood and urine of some of these patients with azotemia have revealed an increase in the residual nitrogen fraction (25,30). This has not been found in all patients with clinical and pathologic changes. Its significance is not known at present

There is no evidence in the present series of cases that ammophyllin or hypertonic glucose solution intravenously led to any diuresis in the patients with impaired renal function. In a case following the administration of albumin intravenously there was an increase in urine output. In 2 other patients to whom albumin was given for a possible diuretic effect, there was no increase in urine output.

It would appear that a very important measure to be taken for preventing renal damage is the prompt and vigorous prophy laxis and treatment of shock. The efficacy of early alkalinization has not been definitely evaluated The injection of reducing agents to reduce the methemoglobin appears logical but has had no adequate clinical or experi mental trial. Once repail dysfunction has appeared care must be taken in the administration of fluids particularly sodium-contain ing fluids, to avoid overloading the circulation Ammophyllin and hypertonic glucose have not proved useful diuretic agents and the latter in the presence of hypoproteinemia may lead to dangerously low plasma protein concentration Albumin should be tried. particularly if there is hypoalbuminemia and peripheral edema. A possible danger would be the production of pulmonary edema. The use of diathermy (10) x ray (20), decapsulation (1), sympathectomy (20) and spinal anes thesia (20) have not been evaluated

It should be mentioned that most of the patients with renal dysfunction died of causes other than renal failure. However it is possible that if these complications can be avoided the patient would go on to death from renal failure. In such cases it would be useful if measures could be taken to tide the patient over until renal tissue has had an opportunity to regenerate and, possibly function to be restored Extravascular (26) or peritoneal dialyzation (22) might be useful if they can be carried out practically and successfully

SUMMARY

1 Forty-seven patients with burns were studied in an attempt to establish a correla tion between kidney function during life and morphologic kidney abnormalities at autopsy

2 Twenty patients had abnormal kidneys at autopsy and except in 2 cases which showed pyelonephritis the renal lesions consisted of tubular necrosis and the presence of pigment and cellular casts in the tubules. The remain ing 27 patients had no significant renal morphologic changes

3 The pigment casts gave positive "hemoglobin stains" but no more specific identification was made

SURGERY GYNECOLOGY AND OBSTETRICS 4. Clinically kidney dysfunction was mani lested by persistent azotemia oliguria, de creased urmary nitrogen excretion, and rare IS MUREPHY W P Boston M. & S. J. 1936, 84 ly edema. Renal dysfunction was probably the cause of death in 2 patients.

5 A close correlation was found among

6 Onto B. H. BARKER, L., and Macantina, H. Proc.
55c. Exp. Biol., N.Y. 2044, 50 day
17 Partina J. P., and Var. 2074, 50 day
Clinical Commission Ballimore Williams and renal dysfunction morphologic abnormalities of the Lidneys and extent of deep burn seventy of shock, and presence of hemoglo-Bell \ York Aced M 19. ROOLE, J. H. and CEURYSHELE, P. E. Brit. M. REFERENCES

Althorous, B. S. J. Urol, Balt., 1945, U. 27
Althorous M. D. and Gillman, D. R. Arch. Int. J. Battra, S. L., and Doors, E. C. Brit. J. Exp. Path.

J. HALER, S. L., EDG DOEDN, L. C. DINL. J. LEIP. INLE., 46, 56 447

46. BOYAL, J. Ball, John Hopkin Hope, 1944, 74, 161

J. Divini C. C. J. and DIRLE, J. H. J. Path. Bact., 1944, 74, 161

J. Marian, C. C. J. and DIRLE, J. H. J. Path. Bact., 1944, 74, 161

J. Path. Bact., 1944, 7

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SOTT. 1944. TO \$71.
7. D. GORD, P. L. Amm. Int. M. 1918. 1 1777
8. DONE R. C. and TROMSON J. C. Arch. Path.

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D. Elsa I. H. Monday F. M. and Farstr. A. W. Area. Surg 443 7 M. Freedom, M. Davinson C. S., and Liverson, S. M.

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1. Sair S. C. H. T. H., and Flexico, E. M. A. Esting, J. M. 91, 79, 79

14. Taring, J. M., 91, 79, 79

15. Coherentions, J. L. Uppeblished

15. Taring, P. J. P. Sairon, S. M. Uppeblished

C. S., and Anasa, M. A. N. England J. M., 1944. ro. Training W Proc. Soc. Exp. Biol., N 1 17 CA.
18 STREE D. D. Personal communication.
18 ARTAN C. K., and DISCONDE, G. Bril. M. J. 910.

so, location F. The Kidney in Health and Disease. P 600 Philadephia Les and Februar Sur 10 WALEER | 18 Princed commenced on 113

J SOMER, W. MUTGATHOOD, F. and OR EN. D. V. T. R. Sec. Trop. M. Hyr. Lond., 896, J. M. J. Clark, C. L. Physiol. Rev., 1643, 917, S. M. L. Linner, E. G. J. Enp. M. Song, S. M. A., Hillers, E. G. J. Enp. M.

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## A NEW METHOD OF TREATMENT FOR SEVERE FRACTURES OF THE OS CALCIS

### A Preliminary Report

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In the past a fracture of the os calcis was a relatively rare injury confined very largely to window cleaners. Modern warfare however with the introduction of the torpedo land mine paratroop landings, and other features of warfare has increased not only its absolute incidence but also the relative frequency of the severe highly comminuted type. Despite the most energetic treatment the resultant disability remains a serious one. Patients are left with persistent pain stiffness inability to walk over rough ground or do ladder work or indeed any form of hard manual labor.

In those cases in which the subastragaloid joint has not been affected early movements

. I rom the Fracture and Orthopaeriic Departments of the Bristol Royal Hospital  $\,$ 



lig 1 Recon truction of the upper surface of a ladir

fractured or calcu-

and freedom from weightbearing for 6 weeks produce good results, and the patients are able to return to their preaccident occupations. But in others even when the fracture does not appear to be a serious one subastrated galoid arthritist develops out of all proportion to the x-ray findings so that the end result is much worse than would be expected the disability consisting as before, of pain and stiff ness. Despite individual variations in toler ance to pain the findings in a large number of patients are remarkably consistent.

Several views of a fractured os calcis were taken and from these the upper surface of the os calcis has been reconstructed as shown in Figure 1. The disruption and distortion of the subastragaloid joint can be seen. Any form of treatment to correct and get hair alignment of this complex joint surface is obviously impossible. Consequently, the patient develops a severe subastragaloid arthritis.

The lateral view which is illustrated in Figure 2 shows how the os cales has been broken on the wedgeshaped lower border of the astragalus



Fig. 2. Lateral view showing os calcis broken on wedgeshaped lower border of astragalus.

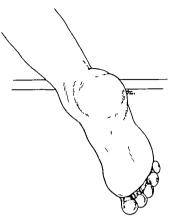


Fig. 5. Condition of foot at operation grossly edeniatous over heel

tient lynng prone an incision 5 inches long was made in the midline from 1 inch above the back of the os calcis over the point of the heel to the anterior end of the bone In desecting the two flaps care was taken not to separate the skin from the deep structures in order to preserve its blood supply. The plantar fascia was spit longitudinally. The os calcis was saved in two slong its long axis and shelled out so as to leave intact the penosteum and the fibers of the Achilles tendon which pass over the bone to become continuous with the plantar fascia.



Fig. 7, left. Exposure of os calcis. A Cut edge of plantar fascia

Fig. 8. Os calcis completely removed. Astragalus exposed. A astragalus B tendon permeus longus C flexor hallucus longus D, flexor digitorum longus, E, soggy edematous tissue in foint, seen after removal of os calcis.



Fig. 6 Incision. Foot in sterile stockinette.

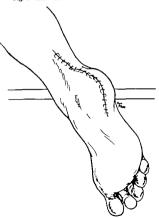


Fig 9. Suture of wound. Incision closed. Restoration of normal outline.

The cortex of the os calcis was extremely thin and the fragments spike like, resembling a broken glass bottle. Figure 4 shows the fragments removed at an

operation for excession of the os calcis

The under surface of the astragalus could be easily seen and was not fractured. It was noted that there was great swelling and bruising of the soft tissues and it is undoubtedly the tension in them which leads to the fibrosis which causes so much stiffening of the joints and the small muscles. The operation not only removes the damaged bone and joint surface, but also relieves the soft tissue tension and reduces the general rigidity of the foot. The wound was closed by suturing the insertion of the schilles tendon, now freed from bone, to the plantar fascia. The two halves f the perioateum and the skin and fascia were sutured in layers with cotton. Two gause pads were placed on each side of the beel to maintain its natural shape and the usual dressings and a firm bandage were applied. The foot was then immobilised in plantar flexion with plaster of Paris.

When the plaster was removed 10 days later the wound was soundly healed and active movements were commenced. Two months after the operation the patient started walking, and was discharged after a months. A year later she walked well and was able to dance. At 18 months she walked without a limp had no complaints, and stated that she was abl t do anything. She could stard on tip-toe and when walking it was impossible to tell which foot had been injured. There was no loss of power and she had full range of inversion and evenion, and freely mobile meditural and too joints. In appearance the

foot was perfectly normal

Local Section 10 Get aged 50 years fell adulation of lofeton a concrete floor no December 21 your and sustained a communited fracture of the left or calcie. It was operated to the next day and almost the whole or calcis was removed except the antenor unt. He was able to posta to work after 6 months and ha been at work ever since. He wasks normally and a salte to run. He can stand on tip-toe and the re is no mable tack of power in the left teg. The Arbillot tendon appears to be as strong in the left side a the right. The appearance of the foot is good and all movement are excellent.

#### AFTER TREATMENT

The for t is immobilized in the original plaster for 1 month. The position of plantar flexion is to ensure relaxation of the Achilles tendon so that its new attachment is not strained. At the end of 4 weeks the sutures are removed and active nonweight bearing exer uses are commenced. The important exer tises are inversion eversion and circumduction. Posttraumatic edema is prevented by in isting that the leg be not allowed to hang down during the 2 weeks immediately follow.

ing removal of the cast except during periods of exercise

When the patient feels able to walk be is encouraged to do so. The average period is about 6 weeks. It is important to see that be is taught to walk correctly and without a lump

#### RESULTS

This new method of treatment of fractures of the os calcis has been performed 15 times to date and the 2 cases reported were the first and therefore have been observed over a considerable time. Three years have now elapsed since the first operation was performed and this girl has an excellent result with practically no disability. The second patient, a bricklayer has now been working for 2 years, without disability.

Two cases were not satisfactors. One a man aged 63 fell 14 feet from a plank directly on to his left heel with the knee straight. He sustained a very severely comminuted fracture of the left os calcus and the os calcis was removed. He made a very poor recovery and got causalgic pains in his leg and at a later date the leg had to be amputated. The section of the foot afterward showed that there was a condition of arteriosclerosis present and be had very poor circulation. There was arthritis in all joints of the foot which was completely stiff and rigid. Whatever treatment this man had he would have had a poor result. Another patient for whom the os calcis of both feet was removed was an old man who had fallen 20 feet and landed on his heels. He also had a very poor result. These were the only two really bad results out of the 15 cases I have done and all the rest of the patients are doing exceptionally well

#### COYCLUSIONS

The results of this operation have been so gratifying that this preliminary report is published in order that others may try it. It probably should be reserved for the several comminuted fractures and like other existence of the strong legation of bones in the foot it is a somewhat difficult operation because of the strong legaments attached to the bone. Unless one is careful to avoid a postoperative hematoma there is risk of sepsis. The operation should

be performed as soon as possible after the in jury in order to prevent intrafascial tension from bleeding and edema which causes ischemia and subsequent congealing of the intrinsic muscles and leads to stiff midtarsal joints and stiff toes. Careful attention must be paid to the after treatment. The chief advantages of this method are

- 1 Freedom from pain
- 2 Good range of inversion and eversion
- 3 Mobility of the whole foot
- 4 Good toe action
- 5 This operation will undoubtedly save many an injured foot from amputation

# LARGE RETROPERITONEAL METASTASIS FROM A SO CALLED CARCINOID OF THE SMALL INTESTINE

JAMES A DICKSON M.D. EDITH M. PARKHILL, M.D. and PAUL C. KIERNAN M.D., Rochester Minnesota

ARCINOMAS of the small intestine are comparatively rare comprising about 3 per cent of all intestinal cancers. The so called carcinoid tu mors constitute approximately a fourth of all malignant neoplasms of the small bowel. These tumors have also been termed argen taffinomas chromaffinomas paragangliomas and primary carcinomas. They occur at least two times more frequently in the appendix than in the small bowel However this type of neoplasm has been known to occur in all locations of the gastrointestinal tract from cardia to anus. In the small intestine carci noid tumors are characterized particularly by occurring in older persons and by the multipli city of their primary lesions in contrast to the single primary lesions occurring in the appendix, which are seen most frequently in younger persons. The present report is concerned with a single small primary growth in the ileum with extension into the mesentery and a large retroperitoneal metastasis of both surgical and pathologic interest.

#### HISTORICAL ASPECTS

Credit is due to Lubarsch who in 1888 clearly distinguished these neoplasms from ordinary adenocarcinomas occurring in the gastrointestinal tract. He reported 2 cases of multiple nodules in the ileum and designated From the Division of Surgray Mays Foosdation, and from the Section on Surgray Mays Foosdation and Surgray Mays Foosdation a

the lesions as primary carcinomas although they appeared somewhat atypical. Ransom in 1890 described i case resembling that of Lubarsch in which the neoplasm had spread into the mesentery and metastasized to the liver

It was Oberndorfer who in 1907 termed

these neoplasms carcinoids to express their malignant appearance in contrast to their benum clinical course. Based on a study of 6 cases of multiple tumors of the small bowel Oberndorfer's description of these neoplasms in summary is worth quoting in part in Forbus translation because some of the points may ment criticism in light of the behavior and character of lesions as reported since that I The tumors are usually multiple 2 The cells are largely undifferentiated masses. but may show glandular form 3 They are circumscribed and have no tendency to infil trate the surrounding tissue. 4 Growth is slow no large size being obtained. 5 The tumors are of a harmless character 6 They he regularly in the submucosa with frequent projections into the mucosa. 7 The stroma is smooth muscle derived from muscularis. We shall not comment in detail on the foregoing points of Oberndorfer's description suffice it to say that carcinoids certainly are not to be regarded as benign and harmless, especially when located in the small bowel

In contrast to the conception of Oberndorfer and in support of Bunting Burckhardt con-

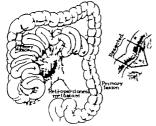


Fig Relation of small bowel t the retroperitoneal mass.

sidered these neoplasms definitely of basal cell character and analogous to the basal cell can cers of knompecher. While meroscopically resembling basal cell epitheliomas superficially these tumors, unlike basal cell cancers, will definitely metastasize as is indicated in reports published within recent years.

#### ORIGIN OF THE SO CALLED CARCINOID TUMORS

The exact cell or cells of origin of these tumors have not been conclusively demonstrated and authorities are not agreed. The weight of the evidence seems to be in favor of their origin from the argentaffin cells found distributed irregularly in the gastrointestinal tract and notably within the crypts of Lieber kuchn The three types of granular cells located in the intestinal tract and described by Schmidt Kultschitzky and Paneth all seem to be implicated as possible sources of these neoplasms. It was Gosset and Masson (7 11) who first showed that certain cells situated at the bases of the crypts of Lieberkuehn reduce an ammoniacal solution of silver salts. The granules in these cells are stained by the chromaflin and silver impregnation methods and by various other stains, perhaps depending on their different functional stages. No explanation of the histogenesis of carcinoid tumors of the small intestine can be accepted without some degree of reservation (1) There may be a common cell of origin or any of the three types mentioned earlier in this para graph and described in detail by Kull may be their source under various attrations

PATHOLOGIC ASPECTS OF SO CALLED CARCINOMY
TUMORS OF THE SMALL BOWE

As mentioned previously these lesions occurring in the small intestine are frequently multiple and occur in an older age group that those found in the appendix, which are unally single (17) The primary tumors are characteristically small in contrast to the much larger metastatic foci. They are char acteristically yellow and frequently one may suspect the diagnosis grossly after sectioning the lesions. Most frequently the lesions do extend into the mucosa and lumen of the bowel but this is not always so in some cases the lesions seem to extend outward into the muscular coats with little or no projection into the lumen Their growth in the intestinal wall results in kinking or angulation of the involved segments. Gross ulceration of mucosa may be absent a fact that explains the absence of intestinal bleeding in many of these cases.

Microscopically these tumors consist of cuboidal, spherical, or cylindrical cells at ranged in small irregularly shaped groups or masses. The nuclei are vericular and rounded or ovoid. The cell groups or nests are usually predominantly solid. The lesions are usually seen in the muscularis mucosae and extend into the mucosa and muscular coats of the intestinal wall. The cytoplasm of these cells has usually an industriet border and is finely granular These granules are both chromaffin and argentaffin The cells on the outermost border of the masses or groups frequently may be seen to be arranged in parallel fashion and assume a cubical shape recalling a similar pat tern seen in basal cell cancera. This feature is more prominent in the fresh frozen sections than in the fixed paraffin sections showing the tumor cells. The cytoplasm of the tumor cells may be finely vacuolated because of the presence of the lipoid material to which the yellow color of the tumor is due. The relative uniformity of pattern of these groups or masses of cells the lack of hyperchromatism the regularity of their nuclei and partial opacity seem to indicate low malignancy Close examina-

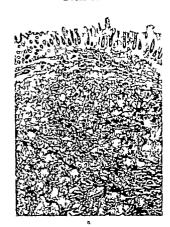


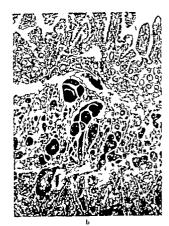
Fig z a, Primary lesion showing tumor cells in and be neath the mucosa of the ileum (hematoxylin and cosin, ×27)

tion of the histopathologic features of these neoplasms of the small bowel does not seem of value in distinguishing those which have metastasized from those which have not metastasized and the picture seems to be similar in the two instances

These neoplasms are carcinomas and are characterized by slow growth Burckhardt remarked that Metastass from carcinoids is merely a matter of time. The malignancy of those in the small intestine is manifested much more frequently than the malignancy of those occurring in the appendix Dockerty Ash burn and Waugh (4 5) noted metastasis in at least a third of their cases in which the neoplasm occurred in the fleum.

The carcinoid type of carcinoma spreads by the lymphatics and by venous invasion by the tumor cells. The likeness of these neoplasms to basal cell epitheliomas here terminates because the latter do not metastasize per meate lymphatics, or invade veins

The term carcinoid may be a good term only so far as it distinguishes these neoplasms from other ordinary adenocarcinomas of the

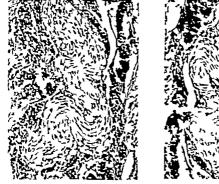


 Argentaffin tumor cells arising in mucosa of small bowel (Masson silver impregnation method, ×27)

intestinal tract. However it should be emphasized again that these tumors are not harmless or benign but malignant and that they will infiltrate and metastasize and may eventually result in the death of the patient Some reports of cases in recent years have even indicated disseminated metastasis as in the case reported by Watz. Even with metastasis in the liver and other widespread regions it should also be emphasized that provided the primary tumors are removed the patient may live for many years in good health as may be anticipated from the very slow growth of some of these tumors. In spite of their slow growth and mild clinical manifestations in many cases, we consider these neoplasms carcinomas.

#### CLINICAL ASPECTS

Symptoms, when present are usually those of a chronic intestinal obstruction resulting from kinking of the involved segments of the bowel. Intussusception of the bowel may occur. Bleeding into the intestinal tract is most frequently absent. The patient is usually not very ill and most often loss of weight



 $\Gamma$  g. 3. a, Permeu al collection of tumor cells from mesenteric metastatic focus (hematoxylin and coda,  $\times$ 180)



b, \ot deeply stained endothelial cells lining periorand space (Schmori's method for chromafia cells, X 80).



Fig. 4, a, Tumor cells from retroperationeal mass, sem are to those in Figures and 3 (hematoxy) and cosin, mass (Masson silver impregnation method, X273).



is not pronounced. In some of these cases the neoplasms are reported as being silent but in the small bowel they frequently give symptoms of obstruction Occasionally there may be a palpable abdominal tumor

Roentgenographically, one may be able to demonstrate slight kinking and angulations of the involved portions of intestine associated with a small tumor projecting into the intes tinal lumen The Linking and the tumor may

### be the only signs demonstrable SURGICAL ASPECTS

The ideal surgical management for carcinomas of the carcinoid type involving the small bowel is resection of the segments of bowel containing the small single or multiple primary lesions with removal of all metastatic foci when feasible, including the involved lymph nodes. It is only in very rare instances because of the size and strategic location of metastatic masses, that it may be inadvisable to attempt their complete removal However when removal of the primary lesions has been performed even with metastatic involvement, the prognosis may be good because of the slow growth of these neoplasms. When patients with metastatic foci located retroperitoneally in the liver or in other locations have had the segments of small bowel containing the pri mary tumors resected, followed by anastomosis of the remaining segments of bowel they have been known to live for many years.

It is important not to overlook multiple small primary lesions throughout the extent of the small bowel or even in the large bowel in these cases at the time of operation primary lesions may be very small and diffi cult to palpate but their presence may be manifested grossly by a slight kinking or angu lation of the involved segment or segments of

It is not possible to state whether removal the bowel of the primary tumor may have a beneficial effect on the metastatic foci from neoplasms of this type. Because of their slow growth metastatic tumors may be present for a long time without revealing their presence.

In summary the ideal form of surgical management seems to be as radical a removal of the primary lesions and any metastatic foci

as is feasible. When resectability is limited to removal of the primary tumor or tumors, the prognosis may be good and the patient may live for many years in health sufficiently satisfactory to carry on all normal activities in spite of even large metastatic foci

### REPORT OF CASE

The patient a former nurse was a woman 65 years of age who appeared in fair general health She was first seen at the Mayo Clinic July 16 1945 when she stated that she had been fairly well until 5 years ago at which time she became constiputed and began to take dally laxatives At no time had she noticed any bleeding from the gastrointestinal tract A senes of roentgenographic studies had been done and at this early period her condition was diagnosed Two years ago she noticed no improvement and had a second series of roentgenoas spastic colon. grams taken At this time she was told that there was nothing abnormal to be found in her intestinal tract. She had complained for the past year of pain in the right upper quadrant of her abdomen which had been relieved for short periods by colonic irriga tions She had not noted any bleeding or tarry stools There had been no nausea or vomiting There had been no saundice or colle of any kind within recent years Systemic review revealed a history of low back pain during the past year which she had noted most severely during change in position Appendec tomy had been performed 15 years ago and left mastectomy for a benign tumor 12 years ago Ovar iancystectomy had been performed a years previously

Physical examination. The systolic blood pressure was 140 millimeters of mercury and the diastolic pressure 83 the pulse 80 and the temperature 93.6 degrees F The important physical findings were largely limited to the abdominal examination. There was a rather large cylindric, firm alightly tender mass located in the midabdomen, extending longi tudinally to the right of the midline and measuring approximately 10 centimeters in length and 6 centi meters in width The mass was medial to the usual position of the cecum and was only slightly movable No other masses were palpable

Clinical studies were then made. The excretory urogram was essentially negative on each side Studies of the colon also gave negative results and a simple rocatigenogram showed only an opaque real due in the colon. The abdominal field was otherwise negative roentgenographically Complete studies of the blood and urinalysis revealed normal findings.

Operative procedure (abstracted in part) Operation, commisting of resection of a portion of the Beum Beolleostomy (side-to-side) and removal of a specimen from the retroperitoneal tumor for diagnosis was performed by one of us (P C. K.) on August 7 1945 The operative diagnosis was retroperitoneal mails nant tumor with involvement of the mesentery of the small bowel and primary lesion in the small bowel.

Examination of the stomach, colon and first por tion of the duodenum gave negative results. The gall bladder was distended and thin walled but con tained no stones. The liver and pancress were not mal On examination of the pelvis, it was observed that the uterus was atrophic and the adnexa were negative to palpation. The small bowel was normal throughout the jejunum and upper part of the fleum but about the middleum the mesentery was much shortened and was attached to a retroperitoneal mass. There was a slight kinking or angulation in this portion of the ileum and a small nodule could be seen extending to the seroul aurisce. At this same segment of the lieum approximately 3 feet (or em ) of the lower portion of the fleum was closely adherent to this mass. The tumor although not completely fixed, involved the entire root of the mesentery of the small bowel and was closely adherent to the large vessels. Figure 1 illustrates diagrammatically the relative position of the retroperitoneal mass and its relationship to the small bowel. It was thought best not to attempt removal of the retroperitoneal mass. Approximately 3 feet (01 cm.) of the lower part of the fleum was resected including the involved in durated portion of the mesentery the ends of the bowel were turned in and a side to-side anastomosis was performed. The anastomosis was about 3 to 4 feet (or to 122 cm.) proximal to the fleocecal val e and seemed satisfactory. The appendix had been removed previously elsewhere. Biopsy of two specimens from the retroperitorcal mass was performed for diagnosis

Pathelegic aspects The resected portion of the fleum contained a small rounded nodule measuring 1.4 by 1 centimeter located within the wall of the ileum and extending to the serous surface and also several irregular nodules located within the mesen tery of the Geum just beneath the primary lesion. The cut surface of the primary lesion wa smooth and vellow and the lesion appeared to involve predom inantly the submucosa and muscularis but dal not project into the lumen of the small boxel. The involved mesentery wa firm and irregularly shaped and appeared more whitish than the yellow primary lesion. The two small pieces of tissue from the retroperitoneal mass presented an occasional yellowish spot within their substance Microscopically see tions from the primary lesion from the involved mesentery and from the retroperitonesi mass were all similar and characteristic of those of carcinoma of the carcinoid type. The tumor cells were all microscopically identical in each location. The tumot cells were arranged in solid groups or masses made up predominantly of spherical cells. The cytoplasm was finely granular with industriect cytoplasmic borders and the muckel were small rounded or ovoid and vesicular. The fine granules within the cytoplasm of all these tumor cells in each location were both argentaffin and chromaffin. Figure a shows one of the sections taken from the small primary lesion within the wall of the ileum. Figure 3 illustrates one of the sections taken from the involved mesentery of

the fleum. Figure a is representative of one of the sections taken from the retroperitoneal mass, it is evident that the small levion in the wall of the fleum was the primary site and that the nodules in the meantery and the large retroperitoneal mass, which greatly exceeded the volume of the small primary lesion, were metastatic foot. All of these locations, including the primary lesion in the illeum showed carrelmons of the carricold free

Pest prist ere are. The postoperative course was uneventful and the patient was dismissed from the hospital August 14, 1915 and from the clinic August 24, 1915 in a satisfactory condition.

#### COMMENT

Some of the important surgical and pathologic aspects of carcinomas of the carcinold type involving the small bowel have been previously discussed

The case herein reported of a so called carcinoid presented several unusual features of both surgical and pathologic interest. It was illustrative in many respects of these tumors occurring in this portion of the small bowel except that in this case there was only a single primary lesion. However, the rather extensive involvement of the mesentery and the large retroperitoneal metastasis were unusual features. The most unusual feature of this case was the strategic location of the large retroperitoneal mass at the root of the small intestine in proximity to the great vessels in such a manner so as to make its removal inadvisable to attempt In spite of the fact that it was not possible to remove the large retroperitoreal mass, it was possible to remove the primary lesion and the involved mesenters and thus avert any future threat of obstruction which indeed is one of the most likely complications with neoplasms of this type involving the small bowel.

#### SUMMARY

A case of so called carcanold of the Bern with a large retroperitoneal metastasis has been presented. The strategy location of the large retroperationeal mass at the root of the mesentery of the small bowel prevented any attempt at excision but it was possible to remove the primary lesion in the fleam with the involved mesentery and thus relieve any further possibility of obstruction. The case presented illustrates well the fact that there neoplasms can no longer be regarded as benign

and harmless We consider these so called carcinoids of the small bowel to be grade i (Broders method) carcinomas of the carcinoid type in order to distinguish them from the ordinary adenocarcinomas of the intestinal tract. Designation of these neoplasms as grade r carcanomas indicates their slow growth and low malignancy It is felt that the histopathologic picture of those neoplasms which have metastasized is similar to the picture of those which have not metastasized Therefore one is unable to predict on the histopathologic basis which of these neoplasms will metastasize

## REFERENCES

BUNTING C. H. Bull. Johns Hopkins Hosp., 1904, 151 BURCKHARDT J L. Franki Zachr Path 1909, 3 593-637

- 3 COOKE, H H. Arch. Surg 1931 22 568-597 4. DOCKERTY M B., and ASHBURN P S. Arch. Surg
- 1943 47 331-346.
  5 DOCKERTY M B., ASERUEN F S., and WAUGH J M.
- 5 Proc. Mayo Clin., 1644, 19 225-235.
  6. Foraus, W D Bull Johns Hopkins Hosp 1925 37
- 7 GOSSET Å, and MASSON P Presse med. 1914 22
- 237-240 8 NULL HARRY Arch. mlkr Anat. Entwinech 1913
- 81 185-195 N Arch, mlkr Anat. Entwinech.
- 1897 49 7-35 Virchows Arch., 1888, 3 280-317
- 10. LUS ESPOR, OTTO FICTION'S AUGUS, 1000, 3
- 12 OREMOOREE, SICOFRIED Frank Zachr Path.
- 13 PARETH JOSEF Arch, mikr Anat Entwiech., 1888,
- W B Lancet, Lond., 1800, 2 1030-1023-15. SCHEMT J E. Arch. mikr Anat. Entwiech., 1995
- 66 12-40. Minnesota M 1045, 28 558-550.
- 10 WATE, C. C., AHILINGSONG PH. 1945; 20 330"339" 17 WATE T. E. Ann. Surg. 1938, 107 100-100

## INTRATHORACIC TUMORS OF THE SYMPATHETIC NERVOUS SYSTEM

#### R. L. HOLLINGSWORTH, M.D. FA.C.S., Washington, D.C.

FEOPLASMS of the sympathetic nervous system are widely dis tributed, having been reported as occurring in the adrenal (most frequent site) abdominal cervical, thoracic, and pelvic sympathetics the jejunum, celiac ganglion, mesentery liver coccygeal body uterus, cavity of the nose skin and subcutaneous tissue, scapula region and carotid body Their occurrence within the thorax while not rare, is still unusual enough to war rant their being classified as a curiosity by Gray and to justify the continued reporting of individual cases or small groups of cases. More often than not, they are symptomless their discovery being quite accidental. For this reason an accurate estimate of their in cidence can not be made. Mass chest x ray surveys such as preinduction pre-employ ment, and school examinations will inevitably lead to the more frequent discovery of intrathoracic neoplasms, and their removal and consequent correct diagnosis will follow

The present communication deals with the occurrence of these neoplasms, the embry ology of the sympathetic nervous system in its relation to their formation, a discussion of their characteristics and a detailed report of 7 cases which have occurred at the University of Michigan Hospital. In addition the author has found 63 cases of intrathoracic sympathetic tumors reported in the literature Of these 43 or 68 2 per cent were gang loneuromas, 16 or 354, per cent sympathoblastomas (neuroblastoma) 2 or 2 3 per cent sympathogomomas and 2 or 3 2 per cent phe-ochromocytomas.

#### OCCURRENCE

Gray states that in 1864 Knoebellanch reported the first ganglioneuroma in the case of a neuroma reported by Other in 1803. The

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tumor was undoubtedly a ganglion cell tumor The first tumor from the sympathetic nervous system to be adequately described was reported by Virchow in 1864, designated by him as a glioma but believed by Wahl and others to have been a ganglioneuroma. Loretz in 1870 first described ganglioneuromas and reported the first intrathoracic case. But it was not until 1910 that Wright placed these tumors on a sound pathological basis. He called attention to a group of tumors, the nature of which had previously escaped general recognition, and he pointed out their distinguishing characteristics. He considered the essential cells of the tumors to be more or less differentiated nerve cells, neurocytes or neuroblasts, and designated these tumors as neurocytoma and neuroblastoma. Paraganghomas or the chromaffin tumors were first described by Manasse in the suprarenal gland in 1893 Frankel in 1886 and Perley in 1890 described tumors apparently of this type.

True nerve tumors, i.e., growths consisting of specific nerve tissue elements, may occur in any part of the pervous structure. They may be benign or malignant and while they may differ widely in their structure, behavior and occurrence, vet they are closely related ontogenetically Both the benign and malignant forms are well illustrated in the sympathetic system. The benign form includes the gan glioneuromas and the chromaffin tumors, m both of which the cells are more or less highly differentiated. The malignant form, not recognized as such until Wright's epochal work placed them in their proper category are the neurocytomas or neuroblastomas. The confused terminology of this group will be discussed later

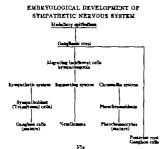
As previously stated, these tumors are as widely distributed in the body as the sympathetic nervous system litself but by far the greater number are to be found in the adrenal. Lewis and Geschickter studed 40 neuro-

HOLLINGSWORTH blastomas and found that 33 of them were in the medulla of the suprarenal gland, or in sympathetic ganglions adjacent to the medulla. Scott and Palmer reviewed the litera ture up to 1932 and found only 37 reported cases of sympathetic blastomatous tumors other than those in the adrenal medulla. Shultz in 1926 reported 53 cases of ganglioneuroma not in the adrenal The number of these cases found in the chest is not stated by either author Loretz's case in 1870 is the first thoracic sympathetic tumor reported Reid lists 3 cases of intrathoracic neuroblastoma and 6 of ganglioneuroma reported up to 1928 Bigler and Hoyne reporting I case of their own in 1934, reviewed the litera ture up to that time and found 11 reported cases in the thorax out of a total of 164 cases of ganglioneuroma in various situations James and Curtis found 33 reported cases up to 1941 and Skinner reporting 1 case in 1943 cites 37 in the literature Wahl and Robinson state that up to 1943 only 13 cases of thoracic neuroblastoma have been reported out of about 200 cases in the entire literature Para ganghoma are rare in adults and rarer in the chest, only 2 cases of thoracic origin having been recorded although Wahl and Robinson report an interesting case of a mediastinal neuroblastoma containing pheochromoblas tomatous elements EMBRYOLOGY

A thorough understanding of sympathetic nerve tumors is dependent on a knowledge of the embryology of the sympathetic nervous system According to Jordan the peripheral nerv ous system comprises nerves and ganglia out side the central nervous system. It includes (i) the cerebrospinal nerves and (2) the sympa thetic nervous system Constituent nerve fibers include both myelinated and unmyelinated varieties. The sympathetic ganglia of both the trunk and head arise from cells which migrate from the neural tube to their defini tive positions In the trunk region the gan glion cells migrate before the formation of definitive nerve fibers and during migration the cells are in an indifferent stage only later developing into either neuroblasts or support ing elements. It is well known that this

migration takes place at an early period of embryological development. In addition to the sympathetic neurocytes, the sympathetic primordium is also the progenitor of the chromaffin (pheochrome) cells In the early stages of development the two can not be distinguished from each other maffin cells are characteristic of the para ganglia the medulla of the suprarenal and the caroud body, although their presence in the latter is denied by some. The paraganglia are formed from groups of these cells which have migrated along the entire sympathetic system Some migrate to the dorsal surface of sympathetic ganglia where they form small rounded masses which become lodged in depressions in the ganglia. Other cells migrate to the kidneys uterus, liver and testes while still others come to rest on the ventral surface of the abdominal sympathetic plexuses and differentiate into larger chromaffin bodies The largest of these are the organs of Zucker kandl which develop in the connective tissue along the sides of the aorta near the bifurca The chromaffin cells of the suprarenal medulla pass laterally from the celiac sym pathetic plexus until they come in contact with the cortical cells which have developed from the celomic epithelium The medullary cells then grow into the mass of cortical cells this growth beginning at about the 12 milli meter stage and continuing until after birth. According to Poll the development of gan glion cells from sympathogonia continues until the tenth year and this may be a factor in the development of neoplastic conditions of the sympathetic system These peripherally migrating nerve cells may come to rest almost anywhere in the body and are capable of proliferating and forming tumors at a later date in life

Experimentally the origin of the sym pathetic system has been proved by Harri son's historic work and confirmed by Van Campenhout They showed that the removal of the entire neural crest from embryo Rama pipens will result in total failure of development of the spinal and sympathetic ganglions throughout the trunk region The motor neurons develop normally but are sheathless the chromaffin apparatus of the adrenal gland



does not develop and there are no sympathetic nerve elements in the wall of the digestive tube.

A critical examination of the sympathetic primordia shows these elements to be totally undifferentiated. They are spherical in shape and possess round chromatin rich nuclei sur rounded by scant cytoplasm. These cells have often been described as lymphoid cells and it is this 'lymphoid characteristic which undoubtedly led early observers to describe tumors composed of these cells as small round cell sarcomas or lymphosarcomas. Even at this early stage according to Bielschowsky these sympathogonia or undifferentiated neurocytes possess very delicate fibrils which are not as yet demonstrable by the silver staining method. Passing along to the next stage of maturation sympathogonias develop into sympathoblasts which are somewhat larger than the former possess a clearer almost vesicular nucleus and a somewhat larger protoplasmic body. In part they produce axones which may be demonstrated by the silver method in the form of fine threads and may be traced over long distances. The final stage of maturation is represented by the sympathetic ganglion cells in which the nucleus-plasma relation is largely in favor of the cell body The cells possess predominantly a multipolar form and exhibit a varied manner of branch ing of their processes. They contain intra

cellular fibrils and chromophile Nissl clumps. These nerve cells are enclosed in a connective tissue capsule and are surrounded by gluogenic satellites.

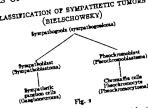
The embryogenic factor of importance in the understanding of the histopathological findings in sympathetic neoplasms is the role played by the sympathogonia. They have been assigned a place in the scheme of development comparable to the rôle of the medulloblast in the developing central nervous system. Schaper was the first to hypothesize indifferent cells, derived from the medullary epithelium, bipotential in their possibilities, and developing into either spongloblasts or neuroblasts. While many workers deny the existence of the medulloblast. His accepted these cells but he did not believe them to be bipotential He believed, rather that each cell was unspotential and was predestined from the beginning to become a spongloblast or a neuroblast Bailey and Cushing believed that Schaper's hypothesis was necessary for a proper comprehension of the normal histogenesis of the brain of malformations of the brain and of brain tumors. Having been generally accepted this theory is likewise essential to a proper understanding of the developing sympathetic nervous system and its abnormalities. Sympathogonia, then, are generally considered as indifferent cells, pluripotential in their possibilities and the mother cells of (a) sympathoblasts and sympathetic ganglion cells (b) the chromaffinic (pheochromic) cell structures which are the pheochromocytes of the adrenal medulla, the paraganglionic bodies and other structures and (c) the immature glial cells of the sympathetic nervous system, the astroblasts, which ripen into mature supporting units, the astrocytes. The genetic elements comprising the sympathetic nervous system are ex pressed schematically in Figure 1

Martius in 1913 described a tumor in which he found both a high degree of differentiation of the fibrillae and the presence of many cells that corresponded to Poll's sympathoblastic He called this tumor a sympathoblastoms and looked upon it as affording the missing link between gangloneuroms and the malignant reumblastoms.

### CLASSIFICATION

Inasmuch as it has been demonstrated that the sympathetic nervous system is developed by a progressive growth of and a differentia tion from the pluripotential mother cells, the sympathogonia, it is to be expected that tumors arising during the process of differ entration may contain cells in varying degrees This naturally produces new growths difficult of classification, as the of maturity tumors rarely contain a single cell type. Various transitions between different forms have been reported and two or three types may be present in one tumor classifications have been offered and even a casual review of what has been written on the subject serves to convince the reader of the confusion which exists. Wahl in 1914 Dunn in 1914 1915 Lehman in 1927 Symmers in 1936 and others have classified cases as neuroblastomas ganghoneuromas and chromaf finomas. Von Fischer in 1922 classified the group according to degree of differentiation Scott and Palmer in 1932 base their classifica tion on the plan proposed by Balley and Cushing for tumors of the central nervous system Bielschowsky believes that a simple classification is best and that any attempt to subdivide on a basis of degree of immaturity only adds to the confusion and his classifica tion is the simplest one found Robertson in 1915 correlated the terms used by previous authors. Neurocytoma (Marchand) = neu roblastoma (Wright) = sympathoblastoma ganglioma embryonale sympathicum (Pick) = sympathogonioma (Kohler) = sym Bailey and Cushing prefer the term sympathicoblast for the primitive pluripotential cell before it has taken on the characteristics of a unipolar neuroblast and they use the term sympathicoblastoma instead of neuroblastoma for all tumors in which the cellular elements are of the undifferentiated type They feel that sympathicoblastoma more definitely places

these tumors because the term neuroblastoma is used also to describe certain cerebral neoplasms. Further all the primitive cells are not potential neuroblasts since some differ entuate into chromaffin cells. On this basis Blacklock classifies all cases, exclusive of the



chromatinomas, into sympathicoblastomas (all malignant) and ganglioneuromas (generally simple and benign) The former he subdivides into (1) undifferentiated (com posed only of sympathogoni) and (2) differ The differentiated be again subdivides into those which are composed of sympathogonia and sympathoblasts and those containing ganglion cells in addition to the more primitive cells. These he terms gangliosympathicoblastoma From a practical clinical and pathological point of view Biel schowsky s simple classification is appealing Schematically it is represented in Figure 2

Bielschowsky makes no attempt to subclassify the tumors according to the various degrees of differentiation as is done by some authors. As has been repeatedly stressed, these tumors are composed of more than one cell type and a thorough understanding of the embryology with the designation of the neoplasm according to the predominant type of cell present, should serve to give one a clear picture of the pathological process

### DISCUSSION

A discussion of sympathetic nerve tumors on a basis of any of the various classifications available is very difficult. However from a review of all available descriptions of the microscopic appearance of the reported tu more I believe that the names neuroblastoma, sympathoblastoma, and sympathicoblastoma have been used interchangeably to designate the immature type of tumor Usually no attempt has been made to separate these im mature tumors into those composed entirely or predominantly of sympathogonia (sympathogonioma), and those in which the

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to		<b>&gt;</b>				75	7	3		43	•				_	_
19-20									•		1					
20-20						1			3	0.						
30-40						6.3			4	9.4		3		100	1	
40-50						12 4		_	_				,		1	

TABLE L-INCIDENCE ACCORDING TO AGE AND SEX - 63 REPORTED CASES

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Over go Not given Total

sympathoblast (sympathoblastoma) in various degrees of maturity is the predominant cell. The present discussion follows Biel schowsky's simple classification (Fig. 2)

Sympathogonioma As is to be expected the sympathogoniomas are very malignant. Found most commonly as a primary growth in one or both adrenals, their occurrence in the chest is rare. Saller and Andrus having reported the only cases. However taking the factors mentioned in the preceding paragraph into consideration one is rustified in assuming that other sympathogonioms are present in the group reported as neuroblastoma or symnathoblastoma. The case reported by Startz and Abrams is an example. This was a 2 year old child who died and at autopsy extensive metastases to the lymph nodes and bones were found. Microscopically the tumor was composed almost entirely of small round cells with scant cytoplasm, typically sympathogonia. Because of their highly malignant nature they are found most commonly in the newborn and in youth rarely in adults. Paradoxically enough, Sailer's case was in a woman of 65 vears of age

Sympathogonioma are extremely cellular being composed of the closely packed lym phoid type of cell previously described. Very little supporting structure is seen. There is a tendency to rosette formation, Lewis and Geschickter having found rosettes in onehaird of their cases and Wahl reporting them in one-half of the cases studied by him. Metastases usually occur early and are widespread, being found most frequently in the

lymph nodes long bones, akull brain, and

Sympathoblasioma Sympathoblastomas. differing only in that they represent greater maturity are somewhat less malignant and usually are found at a somewhat older age. Scott and Palmer reporting on 13 sympathetic tumors other than those in the adrenal gland found that 5 or 38 per cent, were in children 3 years old or younger #4 compared to 11 or 58 per cent, of 19 sympathogoniomas in the same age group. Intrathoracic sympathoblastomas are rare occur ring in only 16 of the 63 cases of sympathetic nerve tumors found recorded to date an incidence of 25 5 per cent. This includes the case of Wahl and Robinson which contained pheochromoblastomatous elements and Cushing and Wolbach's case which was of the dumbbell type the intrathoracic portion being a sympathicoblastoma and the intra spinal portion (removed to years after the intrathoracic operation) a ganglioneurona. The age limits were from 12 weeks to 48 years, 12 of the 16 cases or 75 per cent occurring in children under 10 years of age

Blacklock states that no tumor composed only of sympatholasts has yet been reported. While these cells usually predominate in the over-all picture sympathetic ganglion cells and all degrees of differentiation are encountered. Sympathogonia, sympathoblasts, immature ganglion cells, and mature ganglion cells may be present in one section. On the other hand, sections from different parts of the same tumor may present only one cell type sod unless blocks are cut from various parts and studied an entirely erroneous diagnosis may contend the sympathobe made Not as cellular as the sympathobers of nerve fibrils Differential stains such bers of nerve fibrils Differential stains such connective tissue stains are often necessary for complete classification Metastasizing much more slowly than the sympathogonioms they are more apt to show local invasive tendencies. Their metastasizing tendencies, however are as varied as their microscopic

Ganglioneuroma Passing on to the mature picture tumors we have the ganglioneuroms. In these the neurocytic elements have differentrated into ganglion cells rich in plasma. Con trary to the opinion expressed by Bohrer and Lincoln this tumor is far from rare among children Shultz reported 53 cases of ganglioneuroma not in the adrenal gland Twenty four were in adults, 21 in children and in 8 the age was not stated In the intrathoracic cases the age varied from 1 to 73 years 21 out of 43 cases or 48 8 per cent, being 10 years of age or younger and 29 or 67.4 per cent, under 20 In 3 additional cases the age is not given although one is stated to be a child In none of these tumors however, can age per se be said to be of great importance as all are due to embryonic rests, the age given representing only the age at which they are discovered Sex also is unimportant, 12 of the cases being in females 11 in males and in 6 the sex was not stated (Table 1)

Ganglioneuromas vary in size the reported tumors ranging from that of a hen segg to that of a child a head Usually of firm consistency and well encapsulated, degenerative changes may give the tumor a soft feel beneath a firm outer shell The cut surface may show lobulation and its color varies according to the degree of vascularity Usually they are relatively avascular and present a grayish white to gray glistening appearance Microscoplcally the picture is usually one of rather coarsely arranged fibrous tissue mixed with strands of medullated and nonmedullated nerve fibers the latter predominating as a Multipolar ganglion cells in varying numbers are found scattered throughout

Some areas may be very cellular while in others only an occasional ganglion cell is seen. These areas vary not only in different tumors, but in different parts of the same tumor. Not but in different parts of the same tumor. Not infrequently multinucleated ganglion cells are infrequently multinucleated ganglion cells are year indicating an element of immaturity seen indicating an element of immaturity and in a growth which otherwise has all the criminal growth which otherwise has all the criminal ganglion neurofibroma or ganglionated name ganglion neurofibroma or ganglionated or ganglionated and ganglion ganglionated in the ganglion ganglionated in the ganglion ganglionated in the ganglion gan

article represent this type
Usually considered as benign tumors malig
nant ganghoneuromas have been reported
These are due to an abundant intermixture of
immature ganghon cells and have been
designated as ganghoneuroblastoma.

which Lewis and Geschickter consider the most common tumors of the sympathetic system are exceedingly rare within the thorax only 2 cases having been reported that of Miller in 1924 and Phillip's case in 1940 The case of Wahl and Robinson previously mentioned did contain chromaffin elements although the authors classified it as guishing feature is, of course their affinity for a sympathoblastoma chrome salts The large polyhedral cells in a richly vascularized fibrous tissue stroma show a granular cytoplasm and a large vascular nucleus usually containing one large nucleolus Sections fixed in Orth's solution which contains potassium dichromate stain the cytoplasmic granules a golden yellow

Dumbbel immors Tumors which present both in the chest and in the spinal canal, the so called dumbbell or hourglass tumors, have been described. They are of fairly frequent occurrence, particularly among the ganglioneuromas. While an intrathoracic growth may conceivably grow into one or more of the vertebral foramina, I believe that these tumors are more accurately accounted for on an embryological basis, either from an embryological basis, either from an embryological basis, either from an em an embryological basis, either from an em an emtrostal nerve. Quite frequently it is the pressure of the spinal segment of the tumor

on the cord which brings the condition to the attention of the patient. They are found more frequently in children. Eden in his paner devoted to this type of tumor reports an interesting case of a man 23 years of age whose first symptoms dated back to age 5 when a radiographic opacity in the chest had been diagnosed as an irremovable sarcoma of the spine During the intervening 18 years, he had been free of symptoms but finally presented himself for treatment because of leg weakness and difficulty in urinating the same symptoms which had called attention to the tumor many years before At operation the tumor was found to be a ganglioneuroma, dumbbell type

Unusual types Martius (quoted by Dunn) in 1013 described a case in which a malignant neuroblastoma was removed surgically from the lower part of the neck, and, on subsequent postmortem examination another part of the same tumor in the uppermost part of the thorax was found to be a ganglioneuroma Furthermore Suzuki 1910 Hedinger 1911 and Wahl 1914 have reported cases in which sympathogonia ganglion cells and chromaf fin cells were all present in the same growth. Wahl and Craig have also found that these tumors may be multicentric. While usually of the same type, all three types (neuroblastome ganglioneuroma, and paraganglioma) may be present, occurring independently of each other. They report a case of a 28 year old man in whom three separate growths were found (1) a ganglioneuroma of the sigmoid colon (2) a neuroblastoma in the pelvia and (1) a ganghoneuroblastoma in another part of the pelvis. The only multicentric tumor involving the chest is that reported by Bigler and Hoyne, a mediastinal ganglioneuroma with another located under the right clavicle

Acusofibromas Finally one must not lose sight of the fact that any of the intrathoracic neurogenic tumors may have their origin from the sympathetic nervous system. In speaking of sympathetic nerve tumors, one instinctively thinks only of the immature and mature ganglion cell tumors aiready described. However reference to Figure 1 clearly indicates that all the neurogenic elements found in the neurofibromas schwanomas etc. are de-

rived from the ganglionic crest. In addition to this, even though the neoplasm may grossly appear to originate from an intercostal nerveit must be remembered that intercostal nerves are derived partly from the ganglions of the posterior roots, which ganglions arise from the medullary epithelium by way of the neural There are two schools of thought regarding the origin of neurofibromas, one group who note the presence of collagen and reticulm fibers and regard them as true mesoblistic fibromas, and the second group who trace all the tumors to neural elements, especially the Schwann cells, endoneurium and the lamellar sheath. In either case they may be derived from the sympathetic system and thus subject to classification under this heading. In this connection, a recent case report by Blades and Dugan is of interest. Two neurofibroms were found on the upper sympathetic chain within the thorax and 2 on the left vagus below the recurrent nerve. In addition, this patient had café au last spots in both axillae and on the chest, typical stigms of you Recklinghausen a neurofibromatosis. Removal was without incident. In spite of the definite possibility of their sympathetic origin, no classification has yet been offered which makes provision for the inclusion of this large group of tumors. In fact, they are not usually considered as sympathetic nerve tumors. The increased incidence of the removal of intra thoracic neurogenic neoplasms will undoubt edly stimulate further study of these growths and lead to a more accurate classification.

#### CASE REPORTS

Seven cases of intrathoracic sympathetic nerve tumors have been found in the records of the University Hospital and they are reported somewhat in detail here

CARE I. E. L. B. No. 377134. a year old school control was admitted to the University Hospital on October 4s, 1906 Best. Head correlative was pain in October 4s, 1906 Best. Head correlative was pain in the control october 1906 Best. Head of the pain begin about 196 years previously and had increased gradually up to the time of admission. For the past year there had been abortness of breath on carrition and she had falled to gain weight. One menth perviously she had had an unexplained period of fever up to 103 degree and an x ray film of the chest disclosed a tumor in the left hemithous. Essential physical finding were heart displaced to right, the right border of

HOLLINGSWORTH cardiac duliness being I centimeter medial to the right nipple line and the left border of cardiac dull ness shaded into the flatness of the lower part of the left chest. Heart sounds were normal The left chest was flat to percussion below the left second rib anteriorly the fourth rib in the axilla, and the fifth and sixth posteriorly Below this line breath sounds were absent. Tactile and vocal fremitus were absent In the abdomen fullness was demonstrated in the left upper quadrant and the spleen could be palpated below what appeared to be a tumor mass. The Kahn reaction and all routine laboratory tests were within normal limits The vital capacity was were within mirman minus and vital capacity was 675 cubic centimeters congulation time 6 minutes 7187 examination revealed a gross tumor mass in the left upper abdomen and lower thorax apparently displacing the spleen and kidney down and the displacing the spleen and kidney down and the displacement of the mass was predeminantly posterior There was no evidence of skeletal involvement. Deep x ray therapy had been given without benefit elsewhere before admission. Operation was performed on October 28 1935 by Dr John Alexander Removal of a firm tumor which was retropleural and attached to the entire upper surface of the diaphragm and to the entire anteroposterior diameter of the mediastinum except in the far anternor portion. Only moderate bleeding oc curred all of which was relatively easy to control Patient withstood the operative procedure well but died I hour postoperatively of hemorrhage

Pathological report No 2902 AN A large encapsulated tumor 17 by 12 by 5 centimeters, weighing 1150 grams. Smooth surface lobulated on one side. On cut section surface is yellow gray Microscopic

CASE 2 B L. No 472537 a white gitt, aged 8 years was admitted to the University Hospital on diagnosis ganglioneuroma January 8 1941 This patient apparently had no symptoms referable to the chet. She was seen discountries to the chet. where in December 1940, with the complaint that during the past 4 years the feet had become deformed and interfered with walking She had a pes equinus deformity In the course of her check up examination a chest x ray film was made and showed a complete opacity of the left hemithorax with displacement of the heart and mediantinum to the right. In the standard films, it was impossible to differentiate between a massive tumor and fluid. Later grid films showed a well carcumscribed encapsulated mass in the posterior portion of the encapsulated mass in the posterior portion of the left hemithorax. There appeared to be numerous flecks of calcium within the mass At fluoroscopy it was felt that the mass contained fluid and a thora centesis was done but no fluid was obtained. Fol lowing the thoracentesis there was a sharp rise in temperature to 103 degrees and the pulse rate reached 160. Two days later an exploratory thor acotomy was done and the bropsy material obtained revealed a ganglioneuroma. The child was then sent to the University Hospital for removal of the tumor The past history was noncontributory except for the fact that the child had had measles with a com-

plicating pneumonia 2 years previously She was picating precurrous a years pictured and never really well after this, being nervous and never really well after this, being nervous and irritable and had a poor appetite. The physical examination showed only a poorly nourished girl of 8 years with a pes equinus deformity of both feet No other abnormalities were noted except in the chest where the findings were compatible with the lesion revealed by the x ray examination Routine laboratory tests were within normal limits. The

Operation was performed February 14 1941 by Kahn test was negative. Dr Cameron Haight. The chest was opened through the usual posterolateral incision. The tumor mass exposed was a very firm one In the scapular line the subjacent tumor was adherent to the parietal pleura but in the anterior axillary line a free pleural space was present. The anterior portion of the tumor was not adherent to the lung which was crowded into the anterior portion of the pleural cavity The sixth intercontal nerve entered the capsule. The tumor extended from the third rib posteriorly to the disphragm. Deep fingerlike processes of tumor extended into the eighth ninth and tenth inter costal spaces adjacent to the spine. The mass was removed by blunt and sharp dissection and at about the time it was removed respirations suddenly ceased Only a limited autopay was obtainable and from this it was impossible to determine if the spinal canal had been invaded by the growth No regional metastases were present. Grossly this was a large oval-shaped encapsulated tumor presenting ir regular nodes on the surface and on section a uniform waxy and fibrous, yellowish tissue weight was 595 grams and it measured 16 by 10 by 614 centimeters

Microscopic examination pathological report No 4305 AS The tumor is made up of counties large ganglion cells which frequently contain two or more nuclei and numerous bundles of peripheral nerves lying in a dense connective trisue stroms and showing areas of secondary calcification and peri vascular inflammation Diagnosis peripheral gan glioneuroma.

This was a typical ganglioneuroma showing a relative amount of unmaturity as evidenced by the frequent multinucleated ganglion cells seen

CASE 3 T O No 486332 white schoolboy aged 11 years was admitted July 31 1941 This boy had no symptoms either past or present as a result of the neoplasm present in his chest. A routine tuberculin test at school in May 1941 was positive and for that reason a chest x ray film was made showed the presence of a tumor mass in the left hemithorax. On admission, physical examination was negative except for the chest There were diminished breath sounds at the left aper, extending down to the second anterior rib There was im paired resonance but normal fremitus over this area o rales were heard Posteriorly there was duliness

diminished breath sounds, and whispered volces sounds down to the sixth rib The blood Kahn reaction was negative and all routine laboratory tests were within normal limits. X ray examination of the chest showed a rounded mass in the upper portion of the left hemithorax extending as low as the anterior portion of the lithir interpret. Some crossion of the posterior portion of the third rib was visualized. Oblique and lateral views showed the large mass to lie far posteriorly and adjacent to the vertebral column.

Operation was performed on August 1 1041 by Dr John Alexander The approach was posterolateral through the bed of the fourth rib with resection of about 6 centimeters of the third rib A slightly soft and completely encapsulated peoplasm was found in the costovertebral gutter extending from below the dome of the pleural cavity to the level of the fifth posterior intercostal space. After dividing the parietal pleura around the base of the tumor it was readily removed by blunt dissection, the removal including a lobulation which projected into the mediastinum. The pedicle of the tumor appeared to be at the level of the third intravertebral foramen and the third and fourth transverse proc esses were removed to expose this foramen. tumor was seen to traverse this foramen, which was larger than normal. Portions of the lamina were removed and at a depth of 1 < centimeters in the foramen, the tumor was seen to taper off to a point and was removed completely Recovery was uneventful and the patient left the hospital on the sixteenth postoperative day He has remained entirely well to date.

Pathological report, No 666 AT Microscopically routine hematoxalin and cosin stained slides show a strong having the appearance of a neurofibroma and containing large numbers of typical ganglion cells. Diagnosis, ganglionated neurofibroma

This was another case of a rather large tumor which was symptomless and discovered only accidentally. It was almost a dumbbell type extending for a short distance into the intervertebral toramen.

CASE 4. K T No 436736 white boy aged 13 rears, was admitted December 3 943 This patient had no chest symptoms. A short time before this admission he had had a fall and x ray films of his shoulder were made. These revealed an intra thoracic neoplasm and he was referred to the Uni versity Hospital for its removal. The rest of the history is noncontributory except for the presence of a long standing and very extensive ecsema. Physical examination showed very little. There were some palpable enlarged lymph nodes in the neck and both axillae. A diffuse dry scaly ecsema was noted over the greater part of the body and extremities. There were duliness t percussion and diminished breath sounds over the upper left chest both anteriorly and posteriorly The rest of the examination was nega

tive. The blood Kahn reaction was negative and other routine laboratory examinations were within normal limits. X ray examination of the rheat revealed a fairly extensive homogeneous observeries of the upper portion of the left bemithour, more marked in its median aspect. Films of the dorsal spine revealed extensive erosion of the upper doral vertebral bodies. The erosion beam at the level of second dorsal vertebra and extended downwards as far as the sixth dorsal vertebra. The left lateral and posterior aspects of the vertebral bodies were involved and the abnormality was in the form of scalloping of the margins of these bodies. There appeared to be associated widening of the anterposterior diameter of the spinal canal in the region of the vertebral erosion and there was also associated erosion of the vertebral and posterior portions of the third, fourth and fifth ribs.

Operation was performed December 10, 1043 by Dr John Alexander A posterior approach was used with the incision extending from the second rib over the sacrospinalia muscle downward to the seventh rib and laterally beyond the inferior angle of the scapula. On the posterior surface of the sacrospinshi muscle from the level of the third to the fifth posterior ribs a neurofibromatous lesion was visible. This lesion in the muscle was completely removed, together with the adjacent muscle tissue. This had a vertical length of approximately 4 centimeters and a borisontal width of approximately a centimeters. This was later seen to have arisen from the main tumor mass at the level of the extreme posterior third intercostal space. It was necessary to remove, subperferteally the posterior to centimeters of the fourth, fifth, and sixth ribs. Also the head and neck of the fourth rib were removed so as to give manimum exposure of the third and fourth intervertebral foramen where the tumor times was applied snugly to the foramen. The tumor appeared to be attached to the third fourth fifth, and sixth intercosts! nerves at their emergence from the intervertebral foramens. By blunt and sharp dissection the tumor was finally removed from its bed Usual closure without drainage. The postoperative period was rather stormy and a left-sided empyema had to be drained on the fifteenth day. The ultimate recovery was complete however and the present condition is excellent

Pathological report No 246 AV Hematamias and each stain, sections show large fragments of a membranes. See 16th earth of the strong is educations and company to the strong is educations and the strong is education and the neurophoromatous clements. There was no invasion of the attached muscle and bone fragments. Diagnosis, sensitionated and bone fragments. Diagnosis, sensitionated enerophyroma.

Diagnosis, ganglicosted neurolibroma.

Cast § 1 S. No. scrool white maie, and 19 years, was admitted to the University Hospital 194 6 1044. The chief complaint was extreme dysposition March, 1944, be began to have pain in the right chest which persisted to date. In addition there were couple and ferrer the temperature rising to 103

degrees. Cough was productive and the sputum was streaked with bright red blood. The fever lasted for weeks and then returned to normal. The condition was disgnosed as pneumonia. Although the other symptoms subsided the pain remained and an x ray examination of the chest was made. It revealed a "tumor of the right lung Eleven deep x ray ther apy treatments were given without effect. The pain gradually became more severe. It was both dull and sharp. Worse in the right chest it radiated at times to the right arm. The amount of sputum increased until it totaled about one-half cupful a day. It was purulent but not foul. For the week before ad mission there had been some edema of the feet and ankles. Because of the pain and dyspnes, the patient could not lie down. On admission he was in extreme dyspnea and mildly cyanotic. During the 4 days before operation he was kept constantly on intranasal oxygen The Kahn reaction was negative and all routine laboratory procedures were within normal limits.

HOLLINGSWORTH

Operation was performed by Dr John Alexander on July 20 1944 When the chest was opened a large tumor was found filling the upper half of the right hemithorax. Its size was estimated as about 12 by 12 by 12 centimeters. The right lung was displaced downward and the upper mediastinum to the left. The tumor was "frozen to the mediastinum and to the spine. Removal was impossible. It was impossible to determine whether the mass was merely frozen to the mediastinum and spine or whether it was infiltrating these structures. The inside of the tumor was completely degenerated. The degenerated inner portion of the mass was evacuated and about 52 per cent of the wall was removed in order to relieve the pressure on the traches and great vessels of the upper mediastinum. Dyspnes was greatly improved Recovery was uneventful there being one thoracentesis for the removal of a few hundred cubic centimeters of fluid. He was discharged on the thirteenth postoperative day. The subsequent course was downhill and death was reported to have occurred within a few months. There was no au

Pathological diagnosis No 100 AW Sympathoblantoma

CASE 6 J L. N No 562795 white schoolboy aged 16 years had neoplasm producing no symptoms. The tumor was discovered when a chest x ray film was taken at school in a routine tuberculous survey He was then referred to the University for surgical treatment. The past history was noncontributory The physical examination was negative except for the chest. Posteriorly there was increasing duliness to flatness from the second rib down to the seventh Decreased breath sounds over this same area. The blood Kahn reaction was negative and all routine laboratory tests were within normal limits. A ray examination showed a large mass which was fairly smoothly rounded anteriorly and which lay in the posterior portion of the left hemithorax and extended from the level of the third or fourth dorsal vertebra as far down as the tenth dorsal vertebra. This mass was of homogeneous density and in lateral view it was seen to lie far posteriorly. There was consider able bony architectural change. This consisted of abnormality of the structural character of the fourth, fifth, and sixth vertebrae. There was sug gestive evidence of widening of the neural canal between fifth and sixth dorsal vertebrae and definite abnormality of the left sixth and seventh ribs posteriorly There was what appeared to be loss of vertical height of the sixth dorsal vertebra in the anteroposterior view and in the lateral view there appeared to be some loss in vertical height of fifth dorsal vertebra and possibly also of the seventh. In addition the intervertebral disc space between the fifth and sixth dorsal vertebrae was not easily identified and the pedicle on the left of the fifth dorsal vertebra appeared to be absent. In part, the changes appeared to be due to erosion, probably due to pressure, and in part they may be due to con genital malformation. The changes did not suggest invasion of the vertebra by neoplasm

Operation was performed by Dr. Cameron Haight on February 10 1945 The approach to the tumor was posterolateral through the bed of the resected fifth rib The large tumor mass was partially adher ent to the parietal pleurs and it occupied the nos terior half of the chest at the level of the resected rib The lung was crowded forward by the tumor The tumor was of a firm consistency and had a vellow color. On its surface were scattered areas of organ ized fibrin. The tumor was removed by blunt and sharp dissection. During its removal it was seen that the sympathetic chain and the fifth and sixth intercostal nerves were all either incorporated in or attached to the mass. They were removed with the mass. After the removal of the tumor it was seen that a nodule projecting from the surface of the tumor had caused an erosion of the fifth intervertebrai foramen and had exposed the epidural veins over an area of about 1 5 centimeters. Recovery was uneventful and the patient left the hospital on the thirteenth postoperative day

Pathological report, No 3853 AW The specimen consisted of a grapefruit sized, well encapsulated mass which on section had a firm, whitsh appear ance. Microscopic, a large neurofibroma with a few ganglion cells. Diagnosis ganglionated neurofibroma

CASE 7 D S No 564033 was admitted February 14 1915 This 2 year old boy was seen first in the Department of I editatres. He had been in perfectly normal health until 4 week before admission at which time the mother noticed that he dragging his right left leg. Soon afterward he began dragging his right left leg. Soon afterward he began dragging his right leg also and them crased to walk entirely This condition progressed rather rapidly until he soon was unable to sit up but he complained of no pain. The mother noticed however that there was in creased urificability. There was no incontinence of urine or feces. Two weeks before admission he was seen elsewhere and a diagnous of spinal cord tumor

was made. He was then referred to the University Hospital for treatment. Physical examination re vesled a well developed white boy who did not appear acutely III but who was unable to walk or sit up. All findings, including funduscopic examination of the eyes were negative except the following Extremities showed bilateral paralysis of the legs. The patella reflexes were greatly hyperactive. The right leg offered some resistance when bent. The ankles were quite stiff. The left leg responded markedly when the Babinski test was tried. The right responded with spreading of all toes on trial of the same test. There was no diminution of pain sense. The blood Kahn test was perative as was the tuberculin test All other routine laboratory exami nations showed results within normal limits. X ray examination of the chest revealed a huge solitary well defined tumor occupying the left upper chest with displacement of the mediastinum to the right. Finely dispersed calcification was present throughout the mam. Detail films of the spine showed no abnormality

A lumbar puncture was done on the day after admission and bloody spinal fluid was obtained

There was evidence of a partial block.

The child was seen in consultation by the depart ments of neurology neurosurgery and thoracic surgery It was agreed that the first attack should be directed toward removal of the spinal cord pressure, after which, removal of the intrathoracic portion of the mass would be attempted. The child seemed to remain perfectly well until February 26 at which time he developed a cough and evidence of an acute bronchitis In spite of vigorous treatment he developed increasing respiratory difficulty and died on February 27

Autopsy report. Only the pertinent facts pertaining to the neoplasm will be recorded here. All other findings were essentially normal and no evidence of metastases was found "In the left pleural cavity is a neoplasm measuring 10 centimeters in diameter It is round. There are numerous widely dilated blood vessels coursing over the surface of this neoplasm. The surface is a dull reddish-purple in color and elistening. It is firmly attached at the upper pole to the apex of the left pleural cavity by firm fibrous adhesions. It somewhat compresses the left subclavian artery which courses over its superior surface. There are several pale, white, oval bodies attached to the superior surface which appear to be lymph nodes infiltrated by neoplasm. Posteriorly the neoplasm is attached by fibrous adhesions to the second, third and fourth ribs and so firmly at the root of the second and third that portions of these ribs were removed in order to facilitate removal of the neoplasm. Medially it is attached to the first, second third, and fourth dormal vertebrae, again by firm fibrous adhesions. These vertebral bodies were removed with the tumor and, although the tumor was perfectly encapsulated in other areas, it appears to have invaded the spinal canal at the level of the second and third spinal foramina, extending along the spinal canal for a distance of about a coulmeters and forming a mass within the canal anproximately 1 5 by 1 centimeter in diameter with somewhat compresses the cord, although it does not appear to have infiltrated it. On cut section of the tumor the cut surface is a dull white in color and is moderately firm. There is a medial area which appears somewhat whorled is firm in consistency and is a grayish-white in color " Weight 180 gram.

Microscopic examination revealed many connective tissue fibers showing whorled sress, namerous scattered ganglion cells, areas of calcification. The portion which invaded the spinal canal has a similar appearance. The nodules on the superior surface of the tumor are similar to the neophian, with no evidence that they arose in lymph nodes. Diagnosis, ganglionated neurofibroms.

This case appears to have been a rather rapidly growing ganglioneuroma of the dumbbell type causing paralysis and then death from spinal cord pressure

#### REFERENCES

ALLESON P R., and CARNICHAEL, R. Brit. J Surp.

939- 940, 27: 175 70. 2. ARDRUS, W. DEW. J. Thorse, Surg. 935-1937

6 35 40
5 Balan P, and Commea, H. Tenors of the Glore
Group Philadelphia J B Lippiacott Ca, 1946
4 Billacowsky M Neoblastic temors of the systemperature of the Color and Color

10 Color and Color

11 Color and Color

12 Color and Color

13 Color and Color

14 Color and Color

15 Color and Color

16 Color and Color

17 Color and Color

18 Color and Color and Color and Color

18 Color and Color and Color and Color

18 Color and Colo pathetic nervous system. In Cytology and Cell Pathology of the Nervous System. Edited by

Wikier Penfield. New York Paul B. Hocher Inc S. Broller, J and Hotrer, A. Am J Die Child., 1934.

6. BLACKLOCK, J W S. J Path. Bact., Load 1934.

39 27-41 7 BLAIRE, B and DUGAN D J J Am. M. Am 1943.

201409-4 O. S. BORRER, J V and LINCOLN E. M. J Thorse. Sorg

9. BORET Quoted by Bridge, E. J Mt. Shail Heep N

York, 043-044, 10 410-418.

O. BRIDGE, F J Mt. Stud Hosp. N York, 943-1944, 426-428. CHANDLER, F. A., and NORCEOSE, C. J. Am. M. Ass. 949, 4 19-1 7

2 CLARKE, J M. Amstralas, N Zealand J Sory 1935, 8 00-101

3 COOLEY L. E., and McNanara, F P J Ion M.

Soc., 940, 30 7- 10. 14. Custum H., and Wolkach, S. B. Am. J Path., 1977 3 203-2 5 5 DURN J S. J Path. Bact., Lond., 9 4-915-79

450-473.
6. Ecres K. Brit. J Surg., 1941, 281 549-559.
7. Elonastes, L. Surg Clin. N America, 1933. J 1375

8. Ewine, J. Neoplastic Diseases, 4th ed. Philadelphia W B Sammers Co., 1040. 9. Foor N. C. Arch. Path., Chic., 940, yo. 727-205. 80. Frances, Cooled by Lewis, D. and Gerchickter

C. F Arch Sure, 934, 8

HOLLINGSWORTH INTRATHORACIC TUMORS OF SYMPATHETIC SYSTEM

Chic. 1040 30 722-808.

HART F D and ELLISON P O Proc. R. Soc. Med. Lond., 1937 30 1195 1198.
25 HARTURO, A. and RUBER, S. R. Radiology 1935,

26. HARVEY W C. Lancet, Lond., 1930, 1 405 406.

Lond., 1914 1915 19 416-473.

a8. Hn. W Quoted by Bailey P., and Cushing, H. Tumors of the Giloma Group. Philadelphia J B

10 JAMES, A. G., and CURTS, G M Ann. Surg., 1941 113 767 777 30 JORDAN and KOMBED. Text Book of Embryology

117 03 50.

34. LERMAN Gooted by Scott, E., Oliver M. G., and Oliver, M. H. Am. J Cancer, 10315, 17 395-433.

35. LEWIS, D., and GESCHICKTER, C. F. Arch. Surg

1934, 28 2 16
36. LLOTD M S Am. J Surg 1935 29 477-478,
37 LORETZ. Quoted by Saller Virchows Arch., 1870,

18. MARASSE. Quoted by Lewis, D and Geschickter C. F Arch. Surg 1934, 18: 1 16. 30 MARTIUS, K. Quoted by Dunn, J S J Path. Bact.,

Lond. 1914 1915 19 456-475.
40 Massachusetts Gen. Hosp. Case Records. Report of Case 24422 N England. J M 1938, 219 620-41 McFARLAND J Arch Path. Chic, 1931 11 118-124. 42. MILLER, Reported by Saller S Am J Path. 1943

43 NAPPRIORE, H. C., and BROWN H. A. Arch. Neur

Psychist., Chic., 1933, 19 561 584.

4th ed. New York and London D Appleton-411 ct. New York and London D Appleton-Century Co. Inc., 19, VALLE, A. R., and Garaha, E. A. J. Thorac, Serg., 1944, 13, 116-161 31 Lako F. T. Brit. J. Surg. 1935, 93, 474-477 3. Lax, W. E., and RITTER J. A. Ann. Surg., 1945,

14 607-615

49 435

10 101-190

Lippincott Co., 1916

N America, 1937, 17 905-919.
PATERSON D., and PILCHER, R. Brit. J Surg 1941 18 608-610

46 PERLET Quoted by Lewis, D and Geschickter C. F Arch. Surg. 1934, 28 1 16 47 PHILLIPS, B Arch. Path., Chlc., 1940, 30 916-921 48. POLL. Quoted by Blacklock, J. W S. J Path. Bact. Lond., 1934 39 27-48.
49. RABDY C. B. J. Mt. Sloui Hosp., N. York, 1943 1944.

10 490-422 50 REID M. R. Ann Surg., 1928, 88 516-533. 51 Ricca, T F and Good, L. P Arch. Surg. 1920,

19 309-310. 52 ROBERTSON Quoted by Scott, E. Oliver M G and Oliver, M. H. Am. J Cancer 1933, 17 596-433-53. SALER S Am. J Path. 1943, 19 101 195. 54. SCHAPPIER, V. D., SMITH, R. P. and TAYLOR, H. E. J Thorac. Surg 1943, 11 147-158. SCHAPER, A. Quoted by Bailey P., and Cushing H. Tumors of the Glioma Group. Philadelphia B

Lippincott Co., 1926
56. Scorr E. Ouver, M. G. and Ouver, M. H. Am. J. Cancer 1933, 17 396-433.
57 Scott E., and PALMER, D. W. Am. J. Cancer 1932

16 903-917 58. SEDENER, G. F., BRANCH, A., and ALLEN I. Canad. M. Ass. J., 1943 49 397 309.

50 SOPHIAN L. Ann. Surg 1935 101 827-833.
60 STARTI I. S and ARRAMS, J Radiology 1938 30 232 241

61 SUZUKI, S Quoted by Dunn J S J Path. Bact. Lond., 1914 1915 19 456-574.

62 Symmes. Quoted by Scott, E. Oliver M. G. and Oliver M. H. Am. J. Cancer., 1933, 17, 396-433. 63. VAN CAMPENHOUT Quoted by Foot, N C. Arch

103. VA Conference of the conf

14 797-808.
67 WARL, H. R., and ROBURSON D Arch. Path., Chic. 1943, 35 571-578. 68. WRIGHT J. H. J. Exp. M., 1910 12 556-560

# PH ONIDAL CYST

# Analysis of 100 Consecutive Cases Emphasizing Treatment by Radical Excision Primary Closure and Penicillin Therapy

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T is the purpose of this paper to present a series of 100 consecutive cases of patients with pilonidal cyst (sacrococcy geal cyst teratoma U S Navy nomen clature) operated upon by the author between January 15 1045 and July 30 1045 A new previously unreported method of treatment has been used with results that are believed to be unusual

Eighty-seven of these patients were operated upon by a technique of radical dissection and primary closure to be described and the plentiful use of intramuscular penicillin ther any In 75 cases, healing occurred per primam by the 7th postoperative day The series includes 34 patients with recurrences who had previously been operated upon elsewhere and 66 patients who had not been operated upon prior to admission to this proctology service Of this latter subgroup which proved most amenable to radical excision and primary closure in 60 cases out of 66 or oc o per cent bealing was firm by the 7th postoperative day

The technique employed consists of four

principal features

r Careful preoperative preparation and the routine use of preoperative and postoperative

nenicillin therapy

- 2 Excision of a minimum strip of skin sufficient only to include the ostin of the cyst undermining of the skin, removal of the cyst en bloc and the radical excision of the surrounding fat thus exposing the sacrococcygeal fascia and the gluteal fascia bilaterally to assure removal of all cystic tissue
- 3 Accurate reapposition of the skin and use of wire through-and through sutures in-

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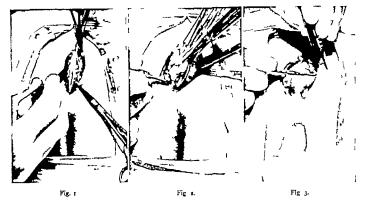
From the Department of Proctology U S. Naval Hospital, Great Lakes, III.

serted to the outer limits of the wound and underneath the sacrococcygeal fascia. The latter sutures are twisted over rolled game dressings and sponge rubber thoroughly to obliterate dead space

Avoidance of the use of any drum or per manent suture in the wound and the removal of all sutures on the 7th postoperative day leaving no foreign body in the wound, thus allowing for a minimum of scar tissue and the restoration of the normal intergluteal fold, without skin tension.

For the sake of presentation and review of cases, the series is divided into three subgroups, the criterion for which was, on admosion and at operation the feasibility of primary closure in each case as determined by the condition of the skin overlying the cyst-That is, whether it was intact except for the embryologic ostra (Subgroup 1) scarred by previous operative procedures and containing artificial ostus but not unduly sacrificed (Subgroup 2) or markedly depleted, scarred, and stretched by previous block excision (Sub-

eroup 1) In Subgroup 1 consisting of all the patients (66) who had not been previously operated upon and who were treated by primary dosure healing per primam occurred in 60 cases, or 90.9 per cent. In Subgroup 2 consisting of 21 patients who though previously operated upon appeared amenable to primary closure successful primary healing was obtained in 15 cases or 71 per cent. Subgroup 3 connested of 13 patients who had been previously operated upon elsewhere two or more times. In these patients primary closure was not attempted because of the marked loss of skin and scarring present. Partial closure was carried out, as will be described in an attempt to cut down the disability time to a minimum



The surgical treatment of pilonidal disease by primary closure has always presented well known problems the most important of which are infection which frequently nullifies the results after the best of surgical techniques and the mechanical problem of closure of the wound without tension after thorough exci sion of the cyst and obliteration of the dead space The sacrococcygeal area is readily contaminated before and after surgery be cause of the proximity of the anus and the tendency for the skin to be moist by perspira tion The skin over the sacrococcygeal area is readily traumatized and is stretched in sit These factors make any postoperative wound vulnerable long after healing has taken place (27) and make it imperative that sound healing be obtained by complete obliteration of dead space by the avoidance of the use of permanent sutures which act as foreign bodies and by use of a technique which does not sacrifice the vitally needed skin overlying this area

The needless sacrifice of skin over this area attendant upon block dissections which include the skin and its ultimate replacement in healing by inclastic scar are at least as great a cause of recurrence due to faulty healing as is the failure to obliterate dead space (22 28)

It is an unfortunate fact that when elliptical incisions are made on either side of the inter gluteal fold the maximum loss of skin occurs where it is most needed in the primary closure of the wound—in the widest diameter over lying the glutea. When primary closures are attempted after elliptical excision of the skin a flattening of the intergluteal fold results—producing a painful scar that is constantly stretched and traumatized (27) when the patient assumes the sitting position

The technique herein presented deals with the problem of infection by adequate pre-



4 fie



operative preparation atraumatic surgery and the unstituting use of pencillin therapa. The second problem that of closing dead space avoiding the loss of skin and maintaining the normal intergluteal fold is met by the following expedients.

- 1 The avoidance of the use of permanent sutures in the wound that may later set up foreign body reaction
- 2 The closure of the dead space, accomplished by the use of multiple, deeply placed wire through-and through sutures that encompass the wound and include the sacrococcygeal fascia. These are later tied over gauze rolls and sponge rubber to compress the wound and reappose the skin and subcutaneous insues to the sacrococcygeal fascia. This dressing is then reinforced with an adhesive tape dressing so applied as further to facilitate the reapposition of skin and fascia and to remove any tension from the sutures.
- 3 The scrupulous avoidance of needless sacrifice of uninvolved skin by removing in the initial incisions, only a thin strip of skin sufficient to include the osts of the cyst whether embryologic or artificial and any scar tissue present, resulting from previous incision and drainage or from more extensive procedures.

#### PREOPERATIVE PREPARATION

All patients, on admission are routinely given sits baths three times daily and instructed to cleanse the sacral area thoroughly with soap and water. Cevitamic acid roo milli grams daily is given by mouth. All patients

are given penicillin therapy from the day of admission—whether the condition of the cyt is quescent infected with or without dranting sinuses or abscessed Penicillin 15,000 units, is given inframuscularly every 3 hours.

When abscesses exist or inadequately draining anuses are present, preliminary morson and drainage are done with local 1 per cent procaine anesthesia. The incision for drainage is linear and made as close to the midline spossible to obviate later difficulties in securing intact skin flaps when complete excision of the cyst is done. Hair and other lose definition must be removed to assure cessation of infection and drainage (r a8). No patient is restyle for indical excision procedure until infection and induration have been thoroughly resolved by attraction and daily sterile dressings.

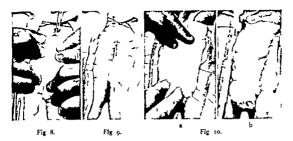
and only sterile cressings.

The night before surgery the sacrococycel area is carefully shaved. The patient receives two enemas one of warm water and one of glycrine and water. A third warm water enema is given in the morning a hour before operation. Morphine sulfate, ½ gran, so scopolamine ; are administered a hour profit operation. At the time of operation the operative field is again carefully scrubbed with sterile green soon and water.

# OPERATIVE PROCEDURE

The technique for this primary closure emphasizes the following points

- i Spinal anesthesia (4) is used.
- 2 Excision of but a narrow strip of skin is done in the midline often no wader than 14



mch to include the ostia of the cyst and scars from previous incision and drainage proce dures (Fig 1) The skin is cleanly and accur ately incised at right angles to facilitate meticulous approximation in the closure

3 Block dissection of the cyst is accomplished down to and exposing the sacrococcy geal fascia in its entirety (Fig 2). The skin edges are then undermined with the scalpel blade partially on the flat, the lateral fatty tissue divided and the subcutaneous tissue and a small amount of fat left attached to the flaps (Fig 3). The triangular strip of fatty tissue remaining on the gluteal fascia is then removed with scassors (Fig 4) thereby leaving the sacrococcygeal fascia and the gluteal fascia denuded bilaterally (Fig 5). Care is exercised throughout to avoid traumatizing the skin flaps or other tissues.

4 Thorough hemostasis is accomplished by the use of plain No coo catgut transfirmon liga tures, electrocoagulation wherever possible and frequent copious irrigations of the wound with hot sterile saline solution

5 Débridement of the wound is then done by carefully excising all loose tags of fat or fascia and floating out small clots and fat globules with further irrigations of hot saline solution

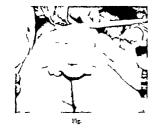
6 A sufficient number (usually 8 or 10) No 30 stainless steel through and through sutures are placed 1/2 inch apart through the skin under the gluteal fascia and under the sacrococcygeal fascia (Fig 6a and 6b) to be used to exert moderate pressure in closing dead space. Several may be required close

together at the distal end of the wound to assure closure of dead space here—especially if the skin incision required extension beyond the tip of the coccyx. The lowermost deep suture may pass through the bone itself if necessary to anchor the suture firmly in the depth of the wound.

7 The skin is then accurately reapposed with No 30 stainless steel wire vertical mat tress sutures (Fig. 7a and 7b)

8 After closure of the skin a thumb forceps is inserted through the upper end of the wound and any serum or blood is evacuated by exerting moderate pressure with gauze pads from below upward (Fig. 8). At this point following accurate reapposition of the wound the skin and its subcutaneous tissues will remain apposed to the sacrooccygeal fascia by atmospheric pressure alone restoring the intergluteal fold (Fig. 9). If however a slight tendency to suching occurs it does not indicate that tension is present and apposition will nonetheless be accomplished when the lateral wires are secured over the gauze dressing.

9 Loosely rolled gauze dressings are then carefully placed next to the suture line and over the wound to keep the tissues apposed to the sacrococcygeal fascia. A section of sponge rubber i by 2 by 4 inches is incorporated into the dressing and some manual pressure is maintained throughout. The through and through wires previously placed are then twisted over the whole dressing, beginning from below upward (Fig. 100 and 100). Care must be exercised to avoid tightening the



wires too much. The elasticity of the dressing itself maintains moderate pressure

- 10 Adhesive tape is then applied to the area in such a manner as further to relieve any tendency to tension on the sutures when the patient moves about in bed postopera tively (Fig. 11)
- 11 All sutures are removed on the 7th post operative day leaving no permanent foreign body in the wound (Fig. 12)

#### POSTOPERATIVE CARE

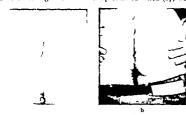
Following surgers, the patients are left at absolute bed rest on the abdomen or on either side for a period of 7 days. The penicilin in doses of 15 000 units every 3 hours intramus cularly is continued until the 8th postopera tive day. The cevitamic acid is likewise continued at 100 milligrams daily by mouth. A low residue high vitamin det is prescribed

and evacuation of the bowel is discouraged until after the sutures are removed. These patients get along surprisingly well and in only 2 instances, when durrhea was present, was evacuation necessary before 7 days. For tunately infection did not develop in either case. There was no appreciable postoperative pain and no necessary for morphile, though 1½ grains of nembutal was prescribed for nocturnal restlessness.

After the 7th day when the sutures have been removed, an enema is given and the patient is allowed toilet and shower privileges. They are cautioned against sitting or undue exertion for a few days to avoid putting stress on the recently headed wound

In treating the type of case described in Subgroup 3 that is, patients with recurrence who had been operated upon two or more times elsewhere and in whom there was an excessive amount of scarring and loss of six as evidenced by the flattening of the intergluteal folds, the primary closure described was not considered feasible nor was it intended for those large postoperative scar defects.

It will be agreed that the surgical problem encountered in such cases was something more than that of the treatment of pilonidal cyst alone. Even after the most conservative treatment at operation when the scar issue was excised these wounds gaped widely as might be expected so that some form of partial closure was necessar; to cover the defect if the prolonged healing time and wide delicate scars associated with healing by secondary intention (27) were to be avoided



The preoperative care and the operative procedure followed were identical with those described for the primary closure operation except that reapposition of the lateral skin flaps after excision of the scar tissue and granula tion tissue pockets was not possible nor con templated.

Accordingly the lateral skin flaps were freed and an adaptation of the horizontal mat treas suture suggested by Captain Harry R Huston M C USNR. Chief of Surgical Services at this hospital was used, effecting the partial closure of the defects by the expedient of securing the skin edges to the sacro-cocygeal fascia. This was done by the use of 4 to 6 horizontal, figure of eight, No 30 stain less steel wire mattress sutures that included the skin edges and the sacro-cocygeal fascia.

Sections of annall gauge rubber tubing were threaded on the wire sutures where they per forated the skin edges. The skin was then drawn down to the sacrococcygeal fascia with as little tension as possible and a greater or lesser gap left between the skin edges according to the amount of skin available to cover the defect. In 6 of these cases, the skin could be brought together with only a very narrow 1/2 inch defect. Accurate reapposition of the skin edges was not possible with this method, nor was it sought, because of the drainage required after excision of these scar tissue caybes.

The sutures were removed on the 7th post operative day by which time some pressure necrosis had occurred under the rubber of each suture. The skin remained attached to the fascia, however, and the center of the wounds healed by granulation tissue. These patients were kept at bed rest. Penicillin therapy 15 000 units every 3 hours, was continued for 10 to 12 days after operation The wounds were irrigated daily with azochloramide solu tion 1 5000 and probed daily with a sterile cotton applicator to break down pocketing A small dressing was then inserted and satur ated with a solution containing 33 milligrams of tyrothricin per 100 cubic centimeters of sterile distilled water

# REVIEW OF CASES

Subgroup 1 In the 66 patients (Subgroup 1) who had not been previously operated upon

20 were free of gross infection at the time of admission although all patients gave a history of previous exacerbations of swelling and ten derness over the cyst area. In 46 cases infec tion was present upon admission. Seventeen of these 46 patients had abscesses which required preliminary incision and drainage prior to operation for radical excision. In 15 other cases of infection acute inflammation was present on admission but there was adequate dramage through the embryologic ostra The inflammation subsided after the patient received hot sitz baths and penicillin therapy In the remaining 14 cases infection was present as evidenced by purulent secretion expressable from the ostia but there was no surrounding inflammation or induration. In these latter cases the infection also responded to sitz baths and penicillin therapy

Incision and drainage of the abscesses were carried out with t per cent procaine solution local anesthesia. An average of 4 hospital days elapsed before radical operation was per

formed in these cases.

As might be expected the locations of the secondary ostia and many of the scars from previous incision and drainage procedures were not conveniently located in the midline Many of the skin incisions later made at oper ation for radical removal were necessarily somewhat curved or irregular in shape in order to remove both scars and sinus openings in the sections of skin removed. The narrow strip of thin skin in the very center of the intergluteal fold was always included in the excision however because it is here that the embryologic ostia are situated In several instances the secondary ostia of these cysts were located an inch and a half or more to either side of the midline and directly lateral to embryologic ostin in the intergluteal fold Vertical curved incisions that would dreum vent both of these openings would necessarily include an excessive amount of normal skin In such cases, the usual strip of skin was removed in the midline and small horizontal elliptical incisions were made on either side of the scarred secondary ostia. These openings were thus buttonholed the ostia with the small elliptical area of akin attached being removed with the cyst as it was dissected en Ыос

In 4 instances sinuses extended to the perianal area where the tracts were palpable in the fat of the ischiorectal fossa. One sinus tract traversed the right ischioanal space about 2 centimeters lateral to the anal verge and opened in the perineum to the right of the urethra. There was one inverted 1 shaped sumus tract, the two limbs of which flanked the anus where an ostium was present overlying each ischiorectal fossa. The tracts in all cases were readily palpable.

In the differential diagnosis from fistula in ano (2 12 15) the tracts were palpable and found not to curve toward the anal canal but were traced directly to the cysts. Probes were readily introduced to trace the course of the tracts. Careful proctocopic examinations were done and the crypts were explored with a crypt hook for possible primary ostia of fistula in an

At operation these sinus tracts were incised over a grooved director and traced to the cyst. They were then completely excessed and the wounds closed as a continuation of the main cyst wound. The deep were sutures traversed the depths of the wounds in the fat of the isotroical fosser. The skin was closed in the usual manner as a continuation of the main cyst wound and the tension sutures tied over rolled gauge dressings.

In 60 of these cases the wounds were cleanly healed on the 7th postoperative day without pocketing hematoma, or other complication. Failure in the remaining 6 cases occurred as follows Three patients developed some pressure necrosis attendant upon the application of excessive pressure when the wires over the dressing were tightened. These patients complained of pain of a throbbing character which is indicative of this mistake. Areas of pressure necrosis 2/2 centimeters in diameter occurred on each side of the wounds where the compression sutures entered the skin. These required 15 17 and 18 days to heal. In 1 case a hematoma developed beneath the scar (2 22) making it necessary to open the overlying skin In this case healing was complete in 30 days. In 2 cases frank abscesses beneath the skin developed which required opening of the wounds These were probed with cotton applicators to break down pocketing arrigated with sterile saline solution and packed with small gauze dressings containing a solution of tyrothricin, 33 milligrams per 100 cube centimeters of sterile distilled water. The intransacular pencillin was continued in all of these cases for 7 additional days in the first 3 and 15 days in the other 3. The tyrothrian solution was added to the dressing every 3 hours and dressings changed daily. In the abscessed patients, the wounds were not allowed to gape but the skin edges were kept toward the midline by the use of large addesive tape bridges. The dressings were applied under the bridges. The average healing time in these 66 cases was 8.7 days.

Subgross 2 The 21 patients with recurrent pilonidal cyst comprising Subgroup 2 had been operated upon elsewhere prior to their admission and infection was present in all cases though there were no abscesses. Thirteen of them had been operated upon two or more times (in 2 instances, 3 operations) but it was impossible to determine what method or methods had been used. The common denormator in this subgroup that made them appear to be amenable to primary closure was the presence of seemingly adequate healthy skin which had not been unduly sacrificed in the previous surfical procedures.

At operation in 3 of the patients who had been operated upon once grously appearing cyalic tissue was present. All of the remaining cases were found to be recurrent because faulty healing and the presence of chronic granulation tissue pockets (22 28) and infected scar tissue.

All of these patients were treated as in group 1 by primary closure after radical excision of scar tissue and granulation tissue pockets. In 15 of these 21 cases healing per primare occurred in 7 days. There were 6 failures, the long est healing time of which was 40 days and the shortest 20 days. In 1 of these 6 cases then had been severe infection upon admission considerable pocketing and scarting and failuring ostita 2 centimeters from the right of the midtine. In this case dead space was not completely dealt with at operation or the lateral skin flaps were too long. There was pocketing under the skin when the sutures were removed and bloody purulent materal

was present. The wound was partially laid open and redressed daily. A sterile dressing was placed in the wound and saturated with tyrothricin solution 33 milligrams per 100 cubic centimeters of distilled water tyrothricin was added to the dressing every a hours. Large adhesive tape bridges prevented the wound from gaping and the dressings were applied under the bridges. In 2 cases small hematomas developed which were evacuated on the 7th day when the statches were removed Fortunately, they occupied only a portion of the wound and the recently healed incisions overlying the hematomas were only partially separated. Here again tyrothricin was used locally in the manner described. In the remaining 3 patients although firm healing took place otherwise small unhealed areas of granulations developed where the skin was reapposed Until these areas were thoroughly dry the wounds could not be classified as bealed

In these cases Carnoy a solution was applied and curettement of the excess granulations carried out after which a small pledget of tyrothricin soaked cotton or gauze was applied and secured by adhesive tape. Covering the wet dressings with waxed paper prevented rapid evaporation in the dressing. The first 3 failures were kept on intramuscular penicillin for 10 additional days making a total of 20 days per case. The latter 3 patients did not require additional penicillin therapy. The average healing time in this subgroup was 12 6 days.

Subgroup 3 These 13 patents admitted with recurrences of pilonoidal cyst had all been operated upon elsewhere two or more times. Upon admission each of these patients was found to have persistent sinuses marked scarring and an excessive amount of skin loss over the sacrococygeal area from previous operative procedures

At operation the sinus tracts were found to be granulation tissue pockets due to faulty healing rather than to residual cystic tissue. In appraising these patients for further surgery primary closure was not considered feasible. The preoperative care and the operative procedure used were for the most part identical with that described for primary closure including removal of all scar tissue and the lateral triangles of fatty tissue overlying the glutea. A partial closure was then done by the use of horizontal mattress sutures through the skin and sacrococcygeal fascia. The su tures were removed on the 7th postoperative day and the wounds were irrigated with 1/5000 azochloramide solution Dauly dressings were done and frequent explorations of the wounds were made with sterile cotton applicators to prevent bridging and pocketing. Slowly heal ing granulations were treated with Carnoy's solution and curettement. Five of the later patients were treated locally by dressings saturated in tyrothricin solution 33 milh grams per 100 cubic centimeters of sterile distilled water Penicillin in 15 000 unit doses. every 3 hours intramuscularly was given without interruption for an average of 18 days The shortest period of time of healing and of penicillin therapy was 12 days (5 cases) and the longest period was 45 days (2 cases) The average healing time was 26 5 days. This is not the method of choice for the treatment of patients with pilonidal cysts not previously operated upon but it is a necessary and valuable expedient in some cases in the handling of some recurrences in which primary closure cannot be accomplished

### DISCUSSION AND CONCLUSIONS

David, Gage Kooistra, and others have long advocated primary closure in dealing with pilonidal cyst before the advent of penicilin and tyrothricin and have presented substantiating evidence favoring the rapid healing and smaller scars attendant upon this method of treatment. Bream pointed out that such scars are more resistant to trauma

Tendler Kleckner MacFee Theis and Rusher and others are agreed that complete excision is easential for cure and that open pack methods of treatment result in prolonged healing and wide delicate scars. That primary skin closures prevent subcutaneous drainage and cause subcutaneous hematomas or serum collections which become infected and result in sinus formation (2, 22, 28) was not borne out by this series of cases. These complications are largely obvisted in the described technique by transfixion ligature of all bleed

ing points penicillin therapy and the use of the through-and through wires for the compression dressing. It is well to point out, however that in cases in which there is failure of primary bealing it is most likely to be due to a hematoma which is readily apparent and palpable on the 7th postoperative day when the sutures are removed.

Magrath believes that the present appellation of pilonidal or sacrococygeal cyst or sinus is unsatisfactory and that the present statistical method of reporting end results of operative procedures is misleading. He fur ther states that under the present system of all inclusiveness, one series of cases may present such extraordinary results that a surgeon may attempt the same type of operation with an entirely different type of involvement and thereby have discourszing results.

Accordingly the author has herein reported a consecutive series of cases and has attempted to lay down the criteria used in a given case in electing to use a technique of primary closure or a method of partial closure followed by tyrothrich dressings. These same criteria and techniques have been used by the writer in operating upon an additional 138 consecutive patients for pilonidal cyst since the completion of the series herein reported and have been found to be applicable in treating pilonidal disease irrespective of the extentof involvement encountered

Fourteen months have elapsed anner the beginning of this series, during which time all of these roo patients have been followed care fully by physical examinations or through periodic questionnaires, stressing pain, soreness, drainage swelling or any disability

The results to date are as follows there were 5 patients with recurrences in this series—3 of whom have been reoperated upon else where and 2 who will undoubtedly require further surgery. In checking back into the operative records and case histories of these recurrences, it was found that 4 of them were in the Subgroup 3 and 1 was in the Subgroup 2 All 5 patients had been operated upon prior to the operation done by the author. In the early part of this series certain significant errors and omissions of technique and medication were made which may well account for

these failures. It was found that in 2 of these early Subgroup 3 cases in which the previous operative scars had been seemingly adequately excised and the skin undermined and sermed to the fascia in the usual manner the throughand through sutures had been omitted and tyrothricin had not been available in the post operative treatment. The other 2 recurrences in group 3 were it is believed, the result of faulty surgical judgment. That is, in these i early cases, the lower third only, of the previous operative scars had been excised as it was in this area alone that recurrence had occurred and it seemed to be an adequate procedure at the time. The edges of the wounds were secured to the sacrococryxed fascia after the skin was undermined in the usual manner One patient had received local tyrothricin after operation and I had not. In any event, this pseudoconservatism in exching only a portion of such a recurrent cyst scar is to be condemned. The other recurrence was in Subgroup 2 The patient had been operated upon twice before and the author made an ill-advised effort to do a primary closure. This failed on the 7th postoperative day as a result of hematoma and the wound required opening and packing with azochloramide 1/5000 dressings. Here again tyrothricin had not yet been made available

It has been observed and repeatedly recorded (21 27) that recurrences are due occasionally to inadequate existion of the sinus but usually to infected granulation usually independent of the sinus but usually to infected granulation usuallined pockets in the depth of the wound. It would seem from this fact and from a study of these recurrences, that saide from the errors of omission in failing to obliterate dead space, the continuous use of tyrotinean solution topically is an indispensable factor in combating infection in these open wounds and in thereby promoting sound healing

Recurrence has not taken place in any of the 75 patients in whom primary cosume was accomplished nor in those patients in whom partial closure with through-and-through wires and tyrothricin dressings was used although all of these men returned to active and oftentimes, to attenuous duty in the may and at this time to various active pursuits in cryllan life. Incisions done for drainage of pilondal cysts preliminary to radical excision or even as a palliative measure for abscess should be made in a position giving due thought to the preservation of the skin for closure in later operation for total removal namely in the midline in the intergluteal fold whenever possible. In this manner, the artificial production of eccentrically situated ostia and sinuses can be largely circumvented and later operation symplified.

Surprisingly enough tender or painful scars have not been an outstanding sequela of this method of treatment although the fat in the interviuteal fold was almost completely ex cised and the wounds closed as described. In the author's experience, tender postoperative scars frequently result from other factors than the lack of a fat pad over the sacrum Tender or painful scars often occur when the skin and scar over the intergluteal fold are under ten sion as in the cases following elliptical incisions for block dissection and primary closure Pain is frequently complained of in the thick broad, adherent scars resulting from block dissection and open pack methods of treat ment or in cases in which deep permanent sutures have been used. Fourteen of the 75 patients treated by primary closure reported various degrees of tightness in the operative scar upon benching over as to tie a shoe lace or discomfiture upon prolonged sitting follow ing a train ride but in no case was it an especially noteworthy complaint and these patients were highly satisfied with the results obtained This tightness was noticeable to more or less extent depending upon the type of work done by the individual and occurred periodically for an average of 8 weeks after operation The other 61 patients in this category reported complete freedom from any local postoperative tenderness or discomfiture after initial healing had taken place. As might be expected more persistently tender scars occurred in the Subgroup 3 patients in whom the wounds had been of necessity left par tially open and healed in by granulation tissue Even here however there were individual variations in tenderness reported that were no more or less than would be expected follow ing any secondarily healed wound in this area.

It is believed that the method of treatment herein presented largely overcomes the causes of recurrence by the use respectively of radical excisions to obviate sinus remnants and a maximum of penicillin therapy plus oblitera tion of dead space to prevent granulation tissue lined pockets

In the author's opinion primary closure is the method of choice in the treatment of pilonidal cyst. The procedure is both practicable and desirable in the vast majority of cases and is adaptable even to some cases of recurrence following other procedures. It eliminates the protracted postoperative treatment and disability attendant upon open methods and circumvents the open wound and attendant infection which is such an important factor in the production of the infected granulation insue lined sinuses of recurrences. The method results in the restoration of a normal intergluteal contour with a minimum of scar tissue that is resistent to training.

#### SUMMARY

I A series of 100 consecutive patients oper ated upon for pilonidal cyst has been analyzed

2 Å technique that stresses sparing of the skin radical excision of all cystic tissue and adjacent fat tissue routine use of penicillin therapy and a type of primary closure that eliminates dead space was used for all patients who had not been previously operated upon (66 cases) primary healing being obtained in 90 9 per cent

3 The same technique was used in recur rences in which the skin had not been unduly sacrificed by previous surgical procedures (21 cases) primary healing being obtained in 71 per cent

4 Partial closure was used in treating recurrences in which the skin had been too widely sacrificed by previous operative procedures to permit primary closure (13 cases) average healing time in these was 26 5 days

#### REFERENCES

- BARTLETT WILLARD Surg Gyn. Obst. 1945 80:59.
   BREIDENBACK L. and WILSON H. L. Ann. Surg 1935 102:455
- 1935 103.455
  5 BERTH DAVID, et al. Am. J Surg 1943 60 r64
  4 BROCKBANK, MARK J and FLOYD, JOE R. Am J
  Surg 1945 68-77

- 5. CAMP MILITON N and PALITES, NICHOLAS. Am J Surg 1943, 50 541

  6. COREN, IAADORE. Am. J Surg 1943, 61:51-66.

  7 DAVID, VERNON C. Nelson Loose Leaf Living Surgery

- Vol. 5, pp 194 96. New York and Edinburgh Thomas Nelson & Sons, 1941.
- 8. Directio, Carl J Mil. Surgeon, 1042, 01'202
- o. DESTABLEMS, EDOUARD | Hôtel-Dien Montréal, 042 :107
- o. DUNITAT J. E., and Marson, D. D. Surg Gyn. Obst.
- 042, 75 727 L. FERGUSCO: L. K., and MICEAY PAUL M. Jr. Am. J
- Surg 937 36 270.

  11 GAST, M. Ann. Surg., 1939, 99 291 303.

  3. Huston Harry R. Personal suggestion.
- A KLECKNER MARTIN S. T Am. Proct. Soc., 1916 17
- 66-73. 5 kometra, H. P. Am J Surg 942, 35.3-7

- 16 LARRY FRANK IL Surg. Gyn. Obst., 032, 54 to-523. LANE, W Z. U S. Nay M. Bull., 1943, 417184;-139.

- 17 LUT, W. Z. U. S. REV SI, 1802, 1914, 411184-112, 103 MACRET, U.M. AM. SOT, 1944, 117 LOS 19. MAGRATE, J. L. AM. J. SOT, 1944, 647 103 SO. MCKMURK, MATREW AMB. SOT, 1933, 0735; MILLINITY, FRANK L. AM. SOTT, 1943, 118 17-18 32. ROCKES, HORATO. N. England J. M., 1945, 227 77
  - 23. SCOTT, JAKES V Ann. Surg., 1943. 7 9 -107
    24. SHARPE, A. MAXWELL. Am. J Roenig., 937 48 303
- 25. Saitte, R. M., Am. J. Roentg., 1937 18 303.
  26. Stroutt, W. G. Minacota M., 937 20.293-294.
  27. Tempera, Monton J. South, M. J., 941 34 115
- s7 TEMPLER, MORTON J South, M. J 641 pt 11th 28. THEIR, FRANK V and RUSHER, MIRRIE W SOF.
- Gyn. Obst., 1944, 79-48a. 29. Warms and Yours. Ass. J Surg., 1943, 40 200-204.
- 30. WOLDERSEE and SHARPE Surg. Gyn. Otat., 1941. 76:164- 70.

# THE LATERAL ABERRANT THYROID

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THE subject of the diagnosis and han dling of lateral aberrant thyroid tissue is of importance for many reasons The existence of tumors arising in such tissue is apparently often not appreciated. They are all potentially malignant. Patients with such tumors respond well when treated by radical operation and intensive radiation. Aberrant thyroid tissue occurs in different types of tumors large and discrete as multiple gland like masses and occurring at the same time as they not infrequently do in the thyroid gland and along the internal jugular veins the tumor in this gland is wrongly con sidered the primary focus of malignant disease, the aberrant thyroid masses along the internal jugular veins metastases and the out come considered honeless.

In the course of embryonic development thyroid tissue which persusts outside of the thyroid gland proper is termed aberrant thy roid tissue. Aberrant thyroid tissue may be of lateral, median or ectopic origin. Lateral aberrant thyroid tissue finds its origin in the ultimobranchial bodies. At the beginning of the seventh embryonic week each ultimobran chial body united with the adjacent fourth parathyroid is set free from the pharynx. During this time growth of the thyroid brings its two lobes into contact with the ultimobran chial bodies. Each of the latter then loses its cavity and becomes incorporated into the thy rold gland. Occasionally the ultimobranchial bodies undergo conversion into thyroid tissue. This conversion is attributed to the dominat ing influence of a thyroid environment on a plastic, implanted tissue. To this degree the ultimobranchial bodies are lateral aberrant thyroid primordia (1) (Fig. 1)

#### INCIDENCE

The presence of lateral aberrant thyroid tu mors is not a common clinical entity. A study at this clinic revealed 30 patients with lateral aberrant thyroid tumors encountered prior to January 1939 (2) Since that date 17 addi tional patients have been treated up to and in cluding June 1945. During this period 25 000 patients were treated for various types of goi ter. Thus approximately 1 patient with lat eral aberrant thyroid was seen for every 500 patients with goiter.

An analysis of the 30 cases seen prior to January 1939 indicates that these tumors may occur in patients at any age but usually under 40 years. They occurred five times more frequently in women than in men. Histopathologic diagnosis in all cases was papillarly cystadenoma showing little differentiation into adult thyroid structure. All were considered either potentially or definitely malignant. As such, the patients were treated by radical operation followed by radiation therapy.

The 17 most recent cases studied at the clinic since January 1939 are presented in Table I

#### CLINICAL PICTURE

Tumors arising in lateral aberrant thyroid tissue produce no characteristic symptoms. The presence of a swelling in the neck is noticed by the patient or found by the examining physician. Most commonly a history is given of a swelling symptomless at onset, which gradually increases in size over a period of months or years. The growth is not only gradual but may not alter its size shape or consistency over a period of years. Occasionally after a long period of no growth a recent rapid increase in size may be noted and cause the patient to seek advice.

These tumors are usually multiple producing movable gland like meases which are located along the neck in front of the sternomastond beside the internal jugular vein (Fig. 2b). At times a long chain of nodules gland like in character can be palpated from the mastoid process and at times below the clavicle along the sternomastoid muscle on one or both sides (Fig. 2a). Occasionally a single deep good sized tumor of the neck, firm in character not unlike a carotid body tumor will prove to be a single lateral aberrant thyroid (Fig. 2c).

# TABLE L - SUMMARY OF CASES STUDIED SINCE JANUARY 1939

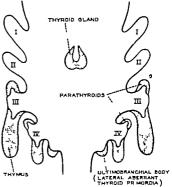
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#### DIFFERENTIAL DIAGNOSIS

The chincal diagnosis of tumors originating in lateral aberrant thyroid tissue is often not made unless one recalls that any laterally located mass may be a lateral aberrant thyroid tumor. In our series before 1939, a correct diagnosis was made preoperatively in 16 per cent of the cases with a tentative diagnosis of lateral aberrant thyroid tumor in an additional 33 per cent. As our knowledge and experience with these tumors have increased our ability to distinguish them preoperatively has like wise increased. In our second series of 17 cases the correct diagnosis was made preoperatively in 80 per cent of these patients.

Aberrant thyroid tumors must be distinguished from all the simple tumors of the neck. By dividing these tumors into median line tumors and lateral neck tumors a simple and practical classification is made available (Fig. 3).

Median line tumors are for practical pur posses almost all limited to the thyroid gland They are the tumors that are limited to the descent of the thyroid. These are the undescended thyroids from their point of origin at the base of the tongue the sublingual thyroids the thyroglossal cysts the pyramidal lobes and the adenomas in the isthmus. The single lateral tumors and sinuses of the neckare the branchial sinuses branchial cysts carot id body tumors and neurofitromas. The mul-



Γig 1

tiple tumors are the aberrant thyroids tubercu lous glands inflammatory nonspecific glands the various other inflammatory types and metastatic and nonmetastatic neoplastic in vasions of glands. In this group of multiple tumors occurs the greatest difficulty in distinguishing tumors of lateral aberrant thyroid origin. Table II will assist in the differential diagnosis of these tumors.

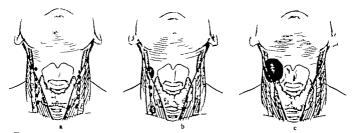


Fig. 2. a, This illustration shows the occurrence of a chain of giand-like bodies often on both adea, in front of the sternomastoid muscle healds the internal jugular vein in lateral aberrant thyroid. b, Multiple gland like bodies,

irregular in size, of lateral aberrant thyroid, occurring lat erally c. The occasional occurrence of a single, discrete good-sized nodule, often not unlike a carotid body tumor is demonstrated

TABLE II. — DIFFERENTIAL DIAGNOSIS OF MAIN DISEASES CONFUSED WITH TUNOSS
ARISING IN LATERAL ABERRANT THYROID

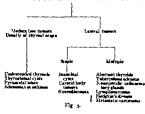
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#### PATHOLOGY

Macroscopic inspection of lateral aberrant thyroid tumors frequently reveals a bluishblack discoloration of the tumor tissue. This color results from blood pigment which weeps from the papilliterous elements of the tumor

The histologic appearance of these tumors is that of a papillary cystadenomatous structure (Fig. 4). Adult thyroid elements are not visualized. This makes it difficult to identify the tissue as of thyroid origin. The macroscopic appearance of this papilliferous tissue is so characteristic and constant, however that whenever a tumor is removed from the

CLASSIFICATION OF SIMPLE NECK TUMORS



lateral region of the neck and is diagnosed at papillary cystadenoma, it is in all probability a lateral aberrant thyroid and is actually or potentially malignant.

Invasive tendencies are found in many of our cases were definitely adenocarcinoma both in cell structure and in invasive charactristics (Fig. 5). In our classification papilary cystadenoma malignant is a little more differentiated and a little less malignant than the papillary adenocarcinoma. Histologically the tumor is predominantly papillary adenocarcinoma with blood vessel invasion.

The problem often arms as to whether or wo these tumors are metastatic glands with the thyroid gland as the primary site of the growth. Several of our patients have shown unlisteral unvolvement of a thyroid lobe with a nodule of papilliferous tissue within the thyroid gland itself. In the majority of instances, however lateral aberrant thyroid nodules have occured with an entirely normal and unnvolved with an entirely normal and unnvolved thyroid gland. When the thyroid gland has been involved, equally good results have followed bemuthyroidectomy including the nodule plus the removal of the lateral nodules and radiation as have followed in the cases in which so nodule was present in the thyroid. Papillary



Fig. 4. The typical papillary cystadenomatous structure of lateral aberrant thyroid tissue is illustrated.

cystadenomatous structures along and behind the sternomastoid muscle as well as those within the thyroid lobe itself can be explained on embryologic grounds without spread or me tastasis in either direction. The lateral aber rant cell masses fuse very early in the embryo with the thyroid of median origin. Since the tumors occur anywhere laterally in the neck or in the thyroid it is probable that the papil liferous aberrant thyroid nodule which also occurs within the thyroid lobe represents another lateral aberrant nodule fused with the thyroid which has failed to atrophy

#### TREATMENT

When multiple tumors of the neck are present an early biopsy to determine the nature of the leason is important in order to under take proper and adequate treatment, particularly when the microscopic report is papillary adenocarcinoma. A diagnosis of lateral aber rant thyroid nodules demands radical surgical

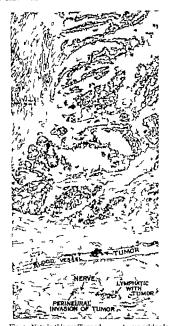


Fig 5. Note in this papillary adenocarcinoma arising in lateral aberrant thyroid tissue all types of invasion blood vessel invasion, penneural invasion, and lymphatic invasion.

treatment followed by intensive postoperative radiation therapy

When a discrete nodule is found without in volvement of the thyroid lobe and without other lateral aberrant thyroid nodules, com plete removal may be sufficient. When several nodules are encountered dissection of the neck on that side is indicated. In the presence of invasion characteristics and the diagnosis of papillary adenocarcinoma, radical neck dissection on the side involved should be performed. This dissection includes removal of the sternomastoid muscle internal jugular.

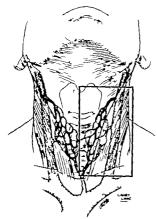


Fig 6. This illustration diagrammatically shows the block of time t be removed in potients with aberrant thyroid times containing papillary adenocareinoma.

Not that this block includes the sternomastoid, the internal jupils th all of its tributaries entering the thyroid, all of the lymphatic nodes and all of the thyroid tissue on the side involved.

vein all lymph nodes and total hemithy rodectomy on that side (Fig. 6)

Postoperative radiation therapy has been employed in all cases in which any criteria of malignancy were demonstrated. A total of 6000 r is applied to the tumor bed over a 22 day period. During the period of treatment serum cholesterol levels are taken. If this level rises to 300 milligrams or more small doses of thyroid extract are administered.

#### FOLLOW UP STIMUS

In our series of cases prior to 1939 our follow up studies show the following. Twentley one of our patients have been followed from 5 to 15 years. Fourteen patients have had no recurrence. During this period 3 have died of other proved causes. Three had recurrence were reoperated upon and are now well. Two are living with recurrence. One patient has had repeated pathologic fractures of the right humerus and another has metastases in boh lungs. One patient died of recurrent miligenant disease of lateral aberrant thyroid organ. Of the other 9 patients, 6 had no recurrence after 4 years. One had a recurrence, was to operated upon and is now well. One patient is living with recurrence. The last patient died of metastases from carcinoma of the hierant (2).

Our second group of 17 cases since 1939 encompasses a follow up period of only 6 year. In 140 these patients recurrence was recorded, in 1 case after 4 years followed by respectance of lymph node metastases 1 year later Reoperation on two different occasions revealed additional tumor. This patient is now well. Three cases are too recent to discuss.

The results of our follow up survey in the entire group confirm the pathologat's beift that tumors of lateral aberrant thyroid orgus are of low malignancy. Adequate radical surgical treatment followed by radiation therapy offers a very favorable prognosis.

#### SUMMARY AND CONCLUSIONS

Tumors of lateral aberrant thyroid origin are discussed. These tumors arise from the ultimobranchial body as a result of departure from normal embryologic development.

Forty-seven instances of these tumors were encountered at the Labey Clinic up to July i 1945. During this same period 25,000 patients were treated for various types of gotter. Thus, one tumor of this type is seen in approximately every 500 gotter patients.

These tumors may occur in patients of any age but usually in those under 40 years. They are more frequent in women than in men.

Clinical diagnosis can usually be made. The leason must be distinguished from the ample neck tumors branchad cysts, carotid body tumors, and neurofibromas. In particular differentiation must be made from tuberubosis, lymphosarcoma, Hodgkin a disease mammatory glands, and metastatic caremona Diagnostis is confirmed by bloppy

The characteristic pathologic picture is a papillary cystadenomatous structure showing little if any differentiation into adult thyroid structure All these tumors must be considered as actually or potentially malignant

Radical neck dissection followed by deep ra diation therapy is the most satisfactory course of treatment. This lesion is of low malignancy and is radiosensitive.

The operative mortality in 47 cases was nil Follow up studies of 30 patients prior to 1939 cover a period of 5 to 15 years. Twenty one of these patients showed no recurrence 4 had recurrence were reoperated upon and have remained well Four died of other causes. One patient died of recurrent malignant disease of lateral aberrant thyroid origin

Follow up study of our most recent 17 cases encompasses the past 6 years. One patient

had a recurrence was reoperated upon twice and has remained well. Three cases are too recent to discuss.

In conclusion whenever a biopsy specimen is taken of a tumor from the lateral region of the neck and the report is papilliferous cyst adenoma or papillary adenocarcinoma in all probability it is a lateral aberrant thyroid Adequate surgical and radiation therapy will result in an ultimate favorable prognosis in the majority of cases

### REFERENCES

- I AREY L. B Developmental Anatomy Philadelphia W B Saunders Co., 1942.
- 2 CATTELL, R B Tr Am Ass. Golter 1940, pp. 218-221 3 KOCHER R A. Cancer Res. 1944, 4 251-256

# URINARY INCONTINENCE DUE TO BILATERAL ECTOPIC URETERS

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RINAR's incontinence due to an ectopic uncertaint of the rind common. In 1918 Eisendrath (1) reported a series of 155 cases of urcters with ectopic openings which he had collected from the literature. In most of the cases the condition was unisternal balateral ectopic ureters were infrequent.

The ectopic ureter is usually avocated with complete duplication of the pelvis and ureter. In most instances the opening of the ureter which leads from the upper agment of the duplicant kilney is ectopic. Rarely, the ureter from the lower agment is ectopic or an ectopic ureter may occur with a kilney which is not duplicated.

I rose the Section on Urology and the Division of Suggery M v. Clanc.



Fig. Extretory program. Duplication of the pelvia and califors of the left inducy is also well. Duplication of the right lodney is suggested by the small amount of medium visible in the proof node.

In cases of bilateral ureteral ectopia the orifices of the ectopic ureters are most frequently situated in the urethra or the vestibule of the vagua. Less frequently one or both ureters enter the prostate urethra, vas deferens, ejaculatory doct, uterus, or vagua.

The condition occurs with much greater for quency among women than among men and the outstanding symptom among women is stream incontinence. In practically all cases the incontinence is congenital diurnal and noctumal and associated with normal voldings. Among men incontinence is usually absent and the conduct is discovered following investigation to determine the source of infection of the urnary tract.

The dagnosis of bilateral ectopic ureten may be exceedingly difficult and, at times, can be only inferred, as in Case 2. If the symptoms suggest ectopic ureter the urethra, vestibule, and vigens must be carefully examined and a search made for the escape of urine from the ectopic order. The intravenous administration of indigocarmore is usually of little value because the function of the portion of kidney drained by the ectopic ureter is not sufficient to concentrate the dye in the urine. It may be possible to eathernore the ectopic uniterest and to secure recolorance as mick!

ureters and to secure pyelograms, as in Case I Excretory urography is valuable in the dist nosis of this condition (2) In most instances bilateral complete duplication of the renal pelver and ureters will be found. However those Kgments of the kidney drained by the ectopic areters (usually the upper) will be visualized family or not at all, because their function is insufficient to concentrate the contrast medium. In such mstances the diagnosis of bilateral complete doplecation must be inferred from the fact that the visualized pelves (usually the lower) appear to drain only the lower portion of each kidney Thus if by excretory prography and retrograde pyelography a diagnosis of bilateral complete displication of the pelvis and ureter is made and if but one ureteral orifice is situated at each extremity of the trigone, a diagnosas of bilateral ureteral ectoph can be made.

In instances in which the ectopic ureters empty into the urethra, the instillation of indigocarmine

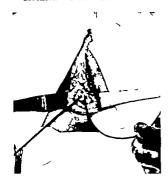


Fig.s The openings of the ectopic ure ters into the vestibule of the vagins.

into the bladder is of diagnostic value as in Case 2. The escape of urine, uncolored with indigocarmine, from the urethra after the dye has been instilled into the bladder is conclusive evidence of the presence of an ectopic ureteral orifice situated in the urethra.

Because of the infrequency of this condition the following 2 cases of bilateral ureteral ectopia are reported

#### REPORT OF CASES

CASE: A single woman, so years of age, stated that she had had urfary locontience since birth and that, as long as she could recall ber undertoltes had been wet. At no time had there been any diumal, seasonal or yearly warl ation at all times her perfocum was constantly and monot councily wet. As a child she had been exmined and treated by several physicians but to no avail. Drastic limitation of fluids and wolding every hour by the clock, during the day and night produced no change. Her parents evolved a schedule whereby the child would recrive as a reward a blue paper star for each day that the remained continent and a good star for each day that the remained continent and a good star for each werk, strews as he might, the unfortunate child never earned a blue star.

hemelt to a wet perfueum. As the maturett, however the found it necessary to change her residence to another state, chiefly because her friends complained of the urinous ode. Two years before coming to the clinic site again had sought medical and. Cystocopic examinatio, had been performed and she had been informed that her right tid ey was in fected and that the cut-off muccle was weak. A plattic procedure whereby the muscles of the urethra were tight ended had been carried out but without benefit.

She stated that she used three sanitary pads during the day and three during the night. She had no other urinary symptoms. She voided easily and painlessly three—four tunes daily and did not have nocturia.

The only pertinent finding n physical examination was inflammation and tenderness of the skin of the vulys and

thighs the urinous odor of these parts was evident. Routine laboratory studies, including urinalysts, yielded normal or negative results. The concentration of urea was 22 n illigrams per 100 cubic centimeters of blood

An exerctory urogram (Fig. 1) revealed complete duptil cation of the pelvis and calices of the left kidney, the visualization of the left ureter was not sufficient to dete more whether this ureter shows an duplicated. The pelvis and calices of the right kidney appeared to be normal a small amount of medium appeared to be present in the upper pole of the right kidney above the visualized pelvis and suggested the presence of duplication. The right ureter was not visualized sufficiently for accurate diagnosis.

Cystoscopy revealed the bladder to be normal one ureteral ordice was situated at either extremity of the trigone. Blisteral retrogated perlegrams outlined only the lower pelves of both kidneys and these appeared normal Specimens of urine which were collected from each kidney were negative microscopically and by means of Gram's

stain. Careful examination of the urethra failed to disclose an ectopic ureteral orifice. After the intravenous administration of indigocarmine diligent examination of the vestibule and considerable probing of various folds finally revealed two ectopic ureteral orifices (Fig. 2). The orifice of the ureter leading from the upper segment of the right kulney was stuated directly below the urethral onfice and a uretral catheter was passed with ease. The orifice of the uretre leading from the upper segment of the left kidney was situated below and starral to the urethral orifice a

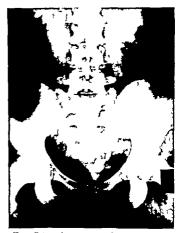


Fig 3 Retrograde ureterogram. The lower portion of the ureter from the upper segment of the left kidney is dilated and torthous. The upper segment of the right kid ney and its uret r are incompletely visualized.



Fig. 4. Bilateral retrograde pyelogram. Complete bl. lateral duplication with bilateral ectopic ureters is shown. Vasualization of the upper segment of the left kidney and its arter is poor because the cutheter could be inserted up the ureter for only—short distance.

ureteral exhibitor could be passed up this retter for only short distances and retrograd prelogram revealed marked dilatation and tortoodity of the lower third of the ectopic left oreter (Fig. 3). A retrograde prelogram of the upper segment of the right bidney disclosed: rudimentary periors and ureterectusis (Fig. 4). Examination of specimen of owns from this segment revealed pravits and bacillaria.

A diagnosis as made of bilateral, complete duplication of the pelves, calices and areters, ith the ordices of the ureters from both upper segments attented ectopically in the vestibule. Bilateral beminephrectomy was advised and carried out.

At the time of the first operation the right kidney was exposed and it was noted that the upper separant represented proximately one-third of the total renal mass. Two sets of abernat vessic started is not superior polatical properties of the started proximately and its urrer passed through the structured posteriorly and its urrer passed through the structured posteriorly and its urrer to the structure of the structure of the structure of the through the renal policie. The abernat vessels are sepanted and ligated separately and the upper sepont of the

kidney was encised.

Convalence was uneventful but urinary incontinence persisted. In spite of our reassurance, the patient as perturbed because it was her impression that the urinary teakage had not been reduced by half.

Two weeks after the first operation surgical exploration of the left kidney was performed. The operative findings

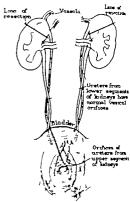


Fig 5. Diagrammatic scheme illustrating the fedor

and surgical procedures were essentially similar to those lists have been described for the right kidney. Left headreparectomy and partial ureterectomy were perferred with case.

After the second operation urisary incontinence curied cultiety. The patient was clared and stated, It's his new fif. An exercisory program made a cells after the second operation revealed powers if entire in to both resulting segments with no deformity of the pelves or calken (Fig. 0. Uritalysis's revealed normal findings and the construction of stress was so milligrams per 100 cubic certificities.

Case A girl, 9 years of age, was brought to the claim by her mother who stated that the child had been incutioned of urine since birth. More recently the patient and complained of burning in the region of the until at their respects the child appeared and behaved normally.

The pertinent finding on physical emainstation as the constant energy of small amount of urine from the crimmal meature. Urinalysis gave negative results. Routher studies of the blood and rocatgemograms of the thorize ere

An exercisory original suggested the possibility of cerplet displication of the pubric, calcer and meter of be the kidney. Although the upper segment could not be timelized, the position of the pelvis in relation to the set inseroutline of the kidney suggested this possibility. The pricince of similar condution of the right kidney as also suggested, but details were obscured (Fig. 2).

Cystoscopic examination ducioned the bladder to it normal, with one ureteral ordice situated t each extractly of the trigone. The internal resicul neck and uretral test appeared normal. A small opening as seen just. him the



Fig 6. Excretory urogram following bilateral heminephrectomy. Both lower segments are functioning normally visualization of the right kidney is incomplete.

external arethral meatus slightly to the left of the middine a catheter could be passed through this opening for only remlimeter. The remainder of the urethra appeared normal, indipocarmine was instilled into the bladder and observation of the urethra did not disclose the escape of any blue stained urine. However an escape of clear urine from the urethra was noted at regular intervals. This finding was considered as evidence that the uretral ordice corresponding to the upper asyment of the left kidney custerd the urethra. The possibility that an ordice from the upper segment of the right kidney was also situated in the urethra was considered. A recommendation of exploration of the left kidney was made in the event that incontinence per sisted after this procedure, a similar procedure on the right kidney was divised.

Emboration of the left kidney was carried out and complet duplied into a the period and ureter was noted. The upper balf of the kidney was found to consist of a hydronephrotic sac with little parenchyma remaining. The ureter leading from the upper segment was tortious and approximately a centimeter in diameter. The remainder of the kitney and the ureter from the lower segment appeared normal. Heminephrectomy, removing the upper segment, was carried out. The pathologist reported hydromephrosis, chronic prehomephritis and hydrometer- so per cent of the renal windstance had been destroyed.

The patient withstood the procedure well and convalescence was uneventful. Urinary inconti ence, however persasted. Excretory urography was repeated and the pel vis of the right kidney appeared normal but was seen to



Fig 7 Excretory urogram The size position, and configuration of the pelves suggest duplication of the pelves and calices.

occupy the lower half of the soft tissue outline of the right kidney. Considerable renal parenchyma appeared to exist above the visualized petvis and this finding strongly suggested the possibility of duplication of the petvis, calcies and ureter of the right kidney. The renaling lower segment of the left kidney was in t visualized satisfactorily but it appeared to be functioning normally.

Cystoscopy was repeated and the urethra was carefully examined, but a second ectopic ureteral orifice could not be found. Indipocarmine was again intilled into the bladder and again an escape of clear urine from the external urethral meatus was noted. This finding was considered as couch sive evidence of complete duplication of the right kidney with the ectopic opening of the ureter from the upper segment situated in the urethra.

Exploration of the right kidney was advised and carried out and complete duplication of the pelvis and ureter was found. The upper segment of the kidney was hydronephrot is and the corresponding ureter was extremely dilated. The lower segment of the kidney and its ureter appeared normal. Heminephrectomy, removing the upper segment, was carried out. The pathologist reported hydronephrosis, chronic pyckocphnitis, and hydroureter to per cent of the renal parenchyme was destroyed.

After the second operation the patient had pe feet un nary continence. Convalencemee was uneventful. An excre tory unogram revealed normal configuration of the lower segments of both kidneys and both appeared to be functioning normally T years after the last operation the patient informed us that sh had no urinary symptoms.

#### COMMENT

A correct diagnosis of ectopic ureter will enable the physician to achieve a brilliant cure by the proper surgical procedure—usually heminephrectomy. Female patients, miserable as a result of urinary incontinence can be restored to perfect continence and male patients can be relieved of

intractable urinary infection by proper dagnoss and sunjical treatment. If incontinence pensis among female patients after unilateral hemsephrectomy bilateral ureteral ectoba is suggested and further urologic investigation of the opposite kidney including exploration if necessary is adicated.

#### REFERENCES

EISTNOBATH D V Urol. Cut. Rev. 938, 427 404-41 2 Greene, L. F. Surg. Clin. V America, 944, 910-411

# STUDIES ON EXOPHTHALMOS PRODUCED BY THYROTROPIC HORMONE

III Further Study of Changes Induced in Fat by Thyrotropic Hormone (Tissue Reactions Associated With Exophthalmos)

RROWN M. DORYNS M.D. Rochester Minnesota

N a preceding publication (11) the reports of Paulson Aird Brock and Smelser which described the presence of round cells in tis L sues of animals given thyrotropic hormone were confirmed, Paulson (17 18) concluded that the reaction he described as Zenker's degeneration in muscle was most marked in the first few days of the administration of the hormone. I recently reported (11) that these new cellular components which appeared in tissue contained they droplets of fat and that the general reaction in fat depots was comparable to the reparative processes which occur in traumatized fat with fat necrosis. Fat was demonstrated by histologic techniques, in abnormal quantities not only in macrophages of connective tissue but in cardiac and skeletal musde fibers, in liver and kidney epithelium in epithelium of the ileum and in reticuloendothelial cells throughout the body

The nature of the reaction and the presence of fat droplets in macrophages and polymorphonu clear leucocytes of connective tissue led to the assumption that this was phagocytosis of fat and probably a form of rapid mobilization of fat Be cause fat seemed to be removed from depots and appeared elsewhere in seemingly abnormal quan tities, the supposition was that fat was being rapidly transported, perhaps via the blood stream Preliminary investigation on centrifuged blood revealed lipemic plasma and a marked increase of the thickness of the buffy coat suggesting leucocytosis. In previous studies with antuitrin T the fat depots did not readily recover their depleted fat and the fat that appeared elsewhere disappear ed rapidly This prompted the question whether fat was being metabolized more rapidly than usual Accordingly experiments were devised for the consideration of the following topics (1) the sequence of events in the histologic changes in duced in connective tissue and liver of guinea pigs

(2) a study of blood fats in such animals (3) a study of blood acetones in such animals and (4) changes that may take place in leucocytes in the circulating blood

#### METHODS

Inasmuch as the changes in the connective tissue of normal animals are as great as in thy roidectomized animals when thyrotropic hormone is administered normal intact animals have been used. The study was based on 14 animals receiv. ing antuitrin T 2 receiving purified thyrotropic factor 4 receiving specific metabolic principle and 8 normal control animals. Most interest centered about the animals receiving antuitrin T for it was this product which induced the most strik. ing reaction in tissues (11) Twelve of the animals which received a cubic centimeter of antuitrin T1 were killed in 31/2 to 24 hours after the single administration The remaining 2 received daily administration of antuitrin T for 2 and 3 days respectively before being killed. All animals were killed by exsanguination by means of an 18 gauge needle inserted through the thoracic wall into the

Coagulation of the blood so obtained was in hibited with sodium oxalate crystals. The blood was centrifuged slowly and only sufficiently to separate the cells from the linemic plasma plasma was dried, ground finely with sand and extracted three times (1 hour each) with a solvent composed of 50 per cent methyl alcohol and 50 per cent chloroform After evaporation of the solvent, the residue was dissolved in chloroform, filtered dried and weighed

The determination of blood acetone was done by the method of Crandall on whole blood

One cubic centimeter of antuitrin T was reported by the man f cturer to contain 3 Junkman -Schoeller units. This unit is defined as that amount of extract which when injected daily for 3 meet as that amount of either which when injected daily for a contract of the proper weighting on any of arms causes re-command the proper weighting on the stress cause of the collection of the contract of the collection and disappearance of collection to the collection of the col

Abridgment f thesis submitted by D. Dobyns to th. Faculty of the Graduat. School of the University of Minnesota in partial faililiment of the requirements for the degree of Fh.D. in Surgery
Dr. Dobyns, Fellow in Surgery M. yo Foundation.



Fig. Phasportonia of fat droplets by tissue macrophages and polymorphomolacule reluceytes in persuretime I depot of an I seet animal that had been given. Stalls continuents of animint I daily for two days. That is the picture seen early after the beginning of the diministration of animitin I Some of the sure macrophages suggest transformation atto dispolalasts (scarlet red and hematonylin, Xygo).

Determinations of fat in the plasma were made no 12 animals that received antuitin T. Eight of these animals were also studied for blood acctone Eight of the normal animals were studied for plasma fat and 5 of that number for blood acctone. Attention should be drawn to the fact that some of the antuitrin T that was used had been heated at a temperature of between 95 and 90 degrees C and 6H for hour. This heated product caused the usual changes in fat, in connective tissue, and organs just as the unheated product du (11).

The leucocytes from the circulating blood of these animals were studied. The cells were drawn up in a pipet from the buffy coat of the centraliged blood. The cells were smeared on a clean slide, fixed in formalia and stained with scarlet red and bemators in Such preparations were made in demikate and triplicate to avoid minimterpretation of artifacts. This procedure were ed as a means of judging the presence of fat droplets in the leucocytes of the blood stream.

The liver spleen, temporal muscle cardia muscle, lung thyroid, orbital contents and from several depots, including perfuretene, and lary cervical and testicular fat were all stables microscopically. These were fixed in ope cert formalla, sectioned on a freezing microtone and stained with scartier red and hematoxyim. The pathologic changes were graded on a base of its 4 (1 being the slightest discernible change and a being the most striking).

#### PERMITS.

As described previously (10) antutrin T cused the animals to become mactive muscularly seak and rough-coacted within a few bours. The same animals which were most profoundly affected had grossly cloudly blood plasma.

The development of kistologic changes. The abnormal appearance of fat in many different tesses was very evident in animals which had received a single administration only a few hours before. The liver muscle, kidney epithelial cells from several locations, the reticulo-endothelial cells of the lung and spleen and the polymorphonuclear levency ict, tissue macrophages and fibroblasts of connective tissue throughout the body were sites of aboutme! quantities of fat. The degree of change with regard both to the deposition of fat in abnormal quantities in various locations and to the development of the cellular reaction (with phagocytosis) in the connective tissue, became more evident at time elapsed following the injection of antuitrin T Two animals which received antuitrin T for only 31/2 hours before they were killed showed thanges which could be graded only I to 2 Two other animals killed in 5 hours showed changes which were graded 2 to 3 By 21 and 24 hours these changes were striking being graded 3 to 4. The tissue changes in these animals after a single in jection were compared with those that were found after numerous daily administrations of antuitra T (11) In animals treated for longer periods there were a decreasing amount of phagocytosis of fat and less fat in the liver keineys, muscle fibers and so forth. The new cellular elements appearing in the connective tissue remained strik ing but the fat droplets in such cells progressively diminished as longer periods of administration of antuitrin T were observed.

During the first few bours after the administration of antuitmn. The cellular reaction in connective lissues consisted of relatively, more poly morphonuclear leucocytes and large tisses merophages. After longer periods the polymorphorclear leucocytes had become relatively inferenced and fibroblasts and lymphocytes had increased.

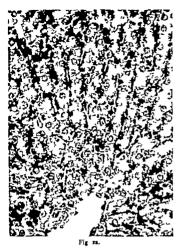
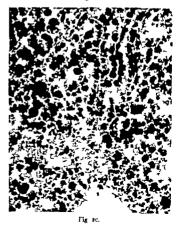


Fig. 2. Microscopic deposition of fat in the fiver of annuls receiving antuitrin T ( $\times 185$ ) a, Three and a half bours after administration of antuitrin T b, Five bours after c, Twenty-four bours after

The lymphocytes did not contain demonstrable fat droplets. Several things suggested a transforms tion from large mononuclear macrophages into fibroblasts. The incidence of fibroblasts seemed less very early but more common later. Cells could be found in all stages of transformation Fibroblasts contained fat droplets just as were found in the macrophages but the quantity of fat contained had become less prominent (Fig 1) These cellular changes were thus found to be a forerunner to the increase of connective tissue throughout the body seen particularly well in fat depots and described elsewhere (11) After 15 or more days of daily administration of antuitrin T the acute phase of the reaction had seemingly passed and in its place an increase of connective tissue was found

The sequence of changes induced in the liver. Special attention was directed toward a sequence of changes in the liver. It was known from former experiments (11) that antultin T caused the appearance of fat in the liver. In 334 hours very mute droplets of fat could be seen in the margin.





of the hepatic cells bordering the blood sinusoids. In 5 hours the fat droplets were larger and more numerous but still occupied that portion of the hepatic cells bordering the blood sinusoids. The fat was somewhat more abundant in the periportal region of each liver lobule than in other regions. Finally in 24 hours the hepatic cells were almost completely filled with fat droplets (Fig. 3) These changes were all induced by a single injection of antuitrin T This progressive accumulation of fat entering hepatic cells next to the blood sinusoids, adequately supports the hypothesis that fat is transported to the liver via the blood stream. An increased presence of fat in the periportal region of the lobule contributes additional support.

Changes induced in the thyroid epithelium. The epithelium of the thyroid gland contained many tiny fat droplets in the cytoplasm of the cell 24 hours after administration of a single large dose of antuntrin T The fat droplets were most numer ous toward the base of the cell Such droplets were not demonstrable in the thyroid cells of normal animals. Although this observation was made rather consistently the relationship of these fat droplets to the developing hyperplastic state in the cells is not understood (Fig 3)

Changes induced in the harderian gland. The harderian gland, which lies within the orbit inside the periorbita, is a ceruminous gland. Its waxlike contents stain deeply with scarlet red. After the administration of antuitrin T the normal waxlike contents of the cells of this gland were reduced in some animals in which considerable alteration of fat was observed elsewhere in the body. How ever the fact that the fat changes in this gland in some animals were not consistent with other

fat changes casts some doubt on this relationship Results of plasma fat determinate us The presence of lipemic plasma in many of these animals which were treated with antuitin T has been mentioned Ouantitative determinations of plasma lipoids reveal considerable elevation of total ippoids after administration of antuitrin T. The plasma lipoids ranged from 140 milligrams to 400 milligrams per 100 cubic centimeters of pleasan in the 8 normal animals. Animals killed 33/2 to 5 bours after administration of a single dose of antuitrin T showed no appreciable rise of plasma lipoids when compared with normal animals. On the other hand after 21 to 24 hours plasma lipoids were found to be as high as 1,050 milligrams per 100 cubic centimeters of plasma. Only 2 of 8 such animals were found to have plasma lipoid levels which were within the range of the normal animals

Results | blood acetone determinations Blood acctone was calculated in terms of beta-oxybu

twric acid. Blood acetone of 5 of the 8 normal animals was determined. The range in these animals was 1.0 milligram to 3.3 milligrams per 100 cubic centume(era of whole blood. Seven of the eight animals which were killed in at 10 a hours after a single injection of antuitin T rece studied for blood acetone. In this group of asi mals the range was 7-4 milligrams to 11-9 milgrams per 100 cubic centimeters of whole blood Although the method of determining blood act tone may be open to some criticism, the results suggest a change in these animals that have re celved antuitrin T

Results in animals treated with so called purific thyrotropic factor Two animals received I cubic centimeter of so called purified thyrotropic lactor containing 5 Rowlands-Parkes units and were killed in twenty hours. The pleasas fat was not elevated in one (280 mgm per 100 cc. of planes) and only very alightly elevated in another (4m mgm per 100 c.c.) Blood acetone in these and mals was 0.4 milligrams and 8.3 milligrams pe 100 c c. of blood respectively

Animals receiving the specific metabolic pracaple showed no appreciable change in plasms lati

Cellular changes induced in blood by thyratrops kormone This report is based on the follower animals 5 received antuiting T 3 received a crude thyrotropic preparation 3 received specific metabolic principle and 4 were normal animah Most interest centers about the animals which re ceived antuitrin T Not only was there an increase in the thickness of the buffy coat of the blood of animals treated with antuitrin T but the polymorphonuckar cells were in great excess. A differential leucocyte count on the animals gives antuitrin T revealed that 82 to 94 per cent of the cells were polymorphonuclear leucocytes in 4 of the 5 animals. This is in marked contrast to the normal animals, which had 5 to 14 per cent of polymorphonuclear leucocytes in 3 of 4 animah In the fourth animal the proportion was so per cent Because of the striking increase of the thick ness of the buffy coat in the blood of animals treated with antuitrin T it may be assumed that the reversal of the ratio represented a polymor phonuclear leucocytosus.

A crude thyrotropic preparation caused a poly morphonuclear leucocyte response in the circumstance in the circum lating blood similar to that produced by antifirm The specific metabolic principle camed a similar response in 2 of the 3 animals.

"One Rowinsde-Parker tax is he amount both her injected dely for f day take too green tensuing greens just Rull cases the thyseol double its week, at these weight of the publication ray."

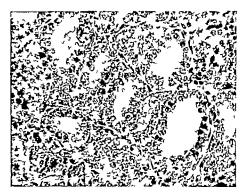


Fig. 3 Fat droplets in the thyroid epithelium  $s_4$  hours after administration of a single large dose of antultrin T (scarlet red and hematoxylin.  $\times 300$ )

Studies on Exophikalmos Produced by Thyrotropic Hormone III Further Study of Changes Induced in Fat Thyrotropic Hormons (Tissus Reactions Associated with Exophthalmos) —Brown M. Dobyns

The fat stained smear of the cells comprising the buffy coat showed fine droplets of fat in the poly morphonuclear cells. These fat droplets were very abundant and large in animals treated with antui trin T but they were relatively small and much less frequent in the cells of the blood of normal animals or animals that had been treated with specific metabolic principle. Animals that had been treated with the crude thyrotropic prepara tion showed some increase of fat in polymorphonuclear leucocytes but less than the increase in animals treated with antuitrin T. A rather definite correlation was found between the presence of fat droplets in the cellular elements appearing in connective tissue and the presence of fat in the polymorphonuclear leucocytes of the circulating blood

#### CONDIENT AND CONCLUSIONS

In a former publication (11) there was described phagocytosis of fat in the cells which were taking part in the connective tissue reaction in animals which received pituitary thyrotropic preparations Associated with this change were the rapid re placement of fat in fat depots by a clear gelatinous substance and the appearance of fat in many locations including the liver muscle and various epithelial and reticuloendothelial cells. In this study it has been found that after a single admin istration of thyrotropic hormone (antuitrin T especially) there is a rise of the plasma lipoids and of the blood acetone simultaneously associated with changes of the lipoids in many organs. These data further contribute to the belief that fat is being moidly mobilized

Studies of the liver reveal a progressive deposition of fat in the hepsitic cells first appearing within a few hours in the edge of the hepsitic cell bordering the blood sinusoids and progressively occupying more and more of the cytoplasm of the hepsitic cells. Best and Campbell have shown that whole anterior pituitary extract caused fine droplets of fat to appear in the hepsitic cells. This was most striking in 3 days but considerably less after 9 days. This has been confirmed with the thyrotropic preparations used in these experiments.

Anselmino and Hoffman recognized a ketogenic property in thyrotropic hormone but reported that the ketogenic action took place only if the thyroid was present. In contrast Houssay and Rietti reported such a ketogenic substance which acted in the absence of the thyroid. In the investing the contrast that the contrast state of the state of the

reactions which were associated with the changes of plasma fat and blood acetone have been found in thyroidectomized animals just as they were found in intact animals (11)

It has been the belief of Boyd and Wilson that the polymorphonuclear leucocytes did not par tempate in the transportation of fat. In these experiments on the influence of thyrotropic hormone in which there was evidence of rapid transfer of fat there was also evidence that polymorphonuclear leucocytes of the blood stream contained more fat than normally Presumably they par ticipated in the transfer of fat Furthermore polymorphonuclear leucocytes are found in great abundance in fat depots and they also are heavily laden with fat here as well as in the blood stream

By chemical analysis but not by histologic technique Dible and Libman have demonstrated an increase of muscle fat of the fasting animal. I have illustrated elsewhere (xx) an increase of muscle fat by histologic technique however the amount of muscle fat found in these fasting animals is very slight compared with the extreme amounts seen soon after the administration of thyrotronic hormone.

Paulson (16) has described changes in hema toxylin and cosin preparations of the harderian glands, which he interpreted as degenerative. In the studies described here using fat staming tech rique it seems that the changes in the vacuolation of the cells in some animals receiving antuitin Tepresent changes in the amount of lipoid content. The connective tissue reaction found there is probably a part of the generalized connective tissue reaction found throughout the body.

There is a very interesting correlation between the elevation of the plasma lipoids and the appear ance of lipoid in the liver. In 3% to 5 hours the appearance of lipoid in the liver was comparatively slight. If was in these animals that normal plasma lipoid levels were found however after 21 to 24 hours the livers were loaded with fat and in the same animals most of the plasma lipoids were found to be elevated.

In a previous publication (11) I pointed out the correlation between exophthalmos and the changes in fat with associated connective tissue reaction when thyrotropic hormone was given MacKay and Sherrill have shown a diminution of the lipoid content of the bodies of thyroidectom itsed rats while the body weight remains the same Whether the fat is catabolized is uncertain. I have shown that thyroidectomy in guinea pigs and man results in an increase of the prominence of the eyes. This fact also suggests a relationship be tween fat metabolism and exophthalmos

It is a well known fact that in clinical subjects following thyroidectomy the blood lipoids tend to rise and the basal metabolic rate falls. Soley (23 24) and I (9) have both shown that with such a fall of the basal metabolic rate there is an associated increase of the prominence of the eyes in clinical subjects. That there may be similarity in these two groups of circumstances seems possible

#### SUMMARY

The edema and cellular reaction in connective tissue of animals made exophthalmic with thyrotropic hormone have been studied more extensively than in former investigations

Following the administration of thyrotronic bormone the appearance of fat in the liver skel etal and cardiac muscle epithelial cells of several locations, phagocytic cells in the lungs, spleen and lymph nodes and in polymorphonuclear leucocytes and tissue macrophages has been further studied with respect to the sequence of events taking place. The earliest cellular reaction was composed principally of polymorphonuclear leucocytes and macrophages but later lymphocytes and fibroblasts which had transformed from macrophages were most numerous. These features have developed simultaneously with the exophthalmos.

The sequence of appearance of fat in liver cells was demonstrated first as tiny fat droplets aduacent to blood sinusoids and later occupying the

entire cell.

The demonstration of the appearance of tiny fat droplets in the cytoplasm of the thyrold epithelium at a time when the gland was becoming rapidly hyperplastic from the administration of thyrotropic hormone was an observation which was presumed to be related to the other phenome na observed

The plasma fat and blood acetones became ele vated simultaneously with the changes in the

lipoid content of many organs.

Associated with these changes was a polymor. phonuclear leucocytosis. These cells were found to contain an excessive number of fat droplets in contrast to cells in the blood stream of normal animals. It is presumed that these fat laden poly

morphonuclear leucocytes in excessive numbers in the blood stream have some relation to the similar cells which contain fat and are so abundant in fat depots and connective times,

These studies shed additional light on the round cell infiltration described by others a exophthalmic animals and perhaps in man. Clinical observations are briefly discussed in the

light of these findings.

Norr. Since the completion of this investigation there has appeared in the literature study by Rundle and Pecks hich indicates an increase in the fat content of eye muscles in cases of exophthalmic goiter Clin. Sc., 1944, 5 5 74

# REFERENCES

A180 R. B. Arch. Ophth., 940, n.s. 24:1167- 74. Idem Ann I t. M., 947 15 564 58 3. AMERIKANO, K. J. and HOTTMAN, FRIEDRICK VIS

exp. Path., Lpz., 934, 75 335 338, Physiol Abstr 935, sorgas.
4. Bust C. H., and Campbell, James J Physiol, 934,

91:0

5. BOYD E. M., and WHAON, K. M. J Cha, In cat 935.

14 7- 5. 6 Brock, Sam. West. J Surg., 04 40 447-445 7 Crandall, L. A. Jr. J Biol. Chem., 940, 33-539-

8. Draiz, J. H., and Lraway Julius. J. Path. Bact

Lord 034, 38 269-254.

o. Dosmes, B M Serry Gyn. Obst., 945, 80 526-333

o. Hild 946, 8 290-300.

Ibid., 609-6 7 HOURSAY B A. and RIETTI C. T. Compt. rend. Sec

biol 937, 26 620-622, 3. JUNEAUNI, KARL, and SCHOPLER, WALTER, Kim 76- 77 Chem. Abstr., 934 Wachr

931 1 26 5627 24. LAMBUR, C.G. M. J. Australia, 939, 2 8 9-830 85-

860.
5 Mackay E. M. and Smillania, J.W. Endoctioology

04 28 5 8. 6 P ULECH, D L. Proc. Soc. Exp. Blol., 937 36 60-

605.
7 Idem Proc. Staff Meet. Mayo Clin., 1939, 14. 828

8 Jo. 8. Idem T Am Am Study Guiter out, pp. 100 310 O. ROWLANDS, L.W. and PARKER, A.S. Blochem J 934

28 820 843. 20. SEFLERE, G. K. Proc. Soc. Exp. Biol 935, 35

Idem. Am J Ophth., 937 so 80-303-z. Idem Am J Path., 939, 5-34-35 3. Soury M H. Arch. Int. M 924, 70-205-330

as Idem. California West. M 944, 60 64-68.

# SPONTANEOUS GASTROINTESTINAL BILIARY FISTULAS

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ONTRARY to accepted opinions spon taneous gastrointestinal biliary fistulas are not medical curosities. Kehr (11) encountered too such fistulas during the routine performance of 2 coo cholecystectomies. Puestow found that 3 5 per cent of all patients having operation on the biliary tract had these troublesome complications. The 15 cases forming the basis of this report represents an incidence of 4.2 per cent. Therefore one of every 25 patients requiring surgical therapy for disorders of the biliary tract will possess some variety of internal biliary fistulas

#### PATHOLOGY

Gastrointestinal biliary fistulas are always secondary to other pathological processes. It is interesting to note that gall stones proved to be the provocative agent in go per cent of reported cases. The close proximity of the gall bladder and choledochus to the duodenum invites the eroding calculi to escape into this portion of the alimentary tract. Six per cent of these spon taneous fistulas are produced by perforating peptic ulcers. If the ulcer is situated on the posterior surface of the duodenum they usually perforate into the choledochus, while those located on the lateral duodenal wall ulcerate through into the gall bladder Gastric ulcers, on the other hand invariably involve the gall bladder. Cancer of the stomach pancreas, gall bladder and common bile duct produces a degenerative necrosis of contiguous viscera so that a variety of internal biliary fistulas result. We have seen one chole cystogastric and one choledochopancreaticoduodenal fistula associated with invasive neoplasms.

An anatomic study of 212 gastrointestinal biliary fistulas reveals the incidence with which the various organs are involved. The gall bladder was involved in 88 per cent, and the common bile duct in 11 per cent. The gastrointestinal component consisted of the divodenum in 69 per cent, colon in 26 per cent and stomach in 44 per cent. Other fistulas were so rare as not to require nota tion.

The biliary dysfunctions following the formation of the gastrointestinal fistula depends largely on the nature of the causative lesion (9). Two courses are open either the fistula closes spon-

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taneously or serious disturbances of the heptobiliary system result. There is abundant evidence indicating that these fistula can and do heal voluntarily Numerous cases have been reported wherein all biliary symptoms subsided after the gall stones had eroded into the duodenum and escaped with the feces. Two of our patients passed very large gall stones per rectum and yet subsequent operations failed to reveal any communication with the intestinal tract. In each instance the gall bladders and duodenum were so adherent to each other that they formed a homog eneous mass of scar tissue. Apparently the gall stones, by a process of ulcerative necrosis had escaped into the duodenum and the fistulous tract had been obliterated by fibrosis. We have seen cholecystoduodenal fistulas close spontane ously as soon as the provocative duodenal ulcer had become quiescent under strict management.

As a rule however the formation of these internal biliary fistulas intensifies the existing henatic dysfunctions by producing a suppurative cholangitis, hepatitis and obstructive jaundice Why do spontaneous biliary intestinal fistulas invariably produce a suppurative cholan gitis while this complication seldom accompanies similar operative fistulas? In both instances regurgitated intestinal contents can be found in the biliary radicals. The explanation lies in the fact that pathological fistulas have a concomitant choledochal obstruction with the resulting stasis of bile. For example, before a migrating gall stone a perforating ulcer or a necrotizing malig nant growth can produce an internal biliary fistula they provoke such an intense inflammatory swell ing of contiguous tissues that a compressive occlusion of the common bile duct occurs. When the static bile becomes infected, the ensuing pancreatitis and cholangitis intensifies the chole dochal obstruction

Cholangiographic studies performed on the operating table indisputably confirm the presence of choledochal obstructions. In all of our opera tive cases the terminal choledochus was so completely occluded that injected diodrast could not be forced through the ampullary opening into the duodenum. Figures 2 3 and 5 reveal that in gested baruum is still incarcerated in the common bile duct 6 hours after the main body of the barum meal has passed from the duodenum into the lower leum and colon. Trace, and McKell



Fig. a. The preploric area of the stomach is occluded by an I distributing proliferrative tumor. The barrium was seen to pass from the stomach through a fattle int the gall bladder but none of the barrium its cried the cystle duct. Note the presence of gall stones. b. \ \ \text{Propress distributions in later those some of the barrium in the inter-

encountered sufficient enlargement of the common bile duct to warrant a choledochotomy in 74 per cent of their cases of internal biliary fistulas. We



I'g a a. Under duroscope vision the barfum was seen t enter the gall bladder through duodenal fattals and then flow through the cystic duct into the choledachus. Observe the pronounced distation of the blie ducts indicatings ampullary obstruction. The gall bladder contains gall tones b. Same pattent 6 boys latter demonstrating.



hepathe bile ducts indicating patent cystic doct. The pil bladder still retains some barium even if the main buriss meal has progressed to the colon. Cholecystogastic sizes is patent but provides inadequat drainage.

believe that the obstruction of the common ble duct with the ensuing biliars stasis constitutes the most important pathological condition excountered in these cases and it must receive primary consideration.



complet retention of the holedochal barium because of an ampullary obstruction. A te that the barium has or caped from the stomach and doodcome yet the comment like duct cannot evenuat its content through the sarpela I Vater. The distantion of the extrahepatic and lattice paths bid educts signifies. Amondo obstructive process.



Fig. 3. a. The barium meal was seen t pass from the doodenum into the upper segment of the cos mon bile duct by means of a choelochoulocheal fistula. No barium escaped into the gall bladder until the entire common duct was filled and then the barium seeped along the patent cystic duct. The dilatation of the bile ducts indicates the

## SYMPTOMS

Gastrointestinal biliary fistulas produce no identifying group of symptoms but rather mimic the characterizing syndromes of the parent pathologic conditions from which they arise For example there are no special signs to tell whether a peptic ulcer has merely perforated into the periduodenal tissues or actually eroded into the common bile duct. Likewise an obstructive carcinoma of the stomach seldom announces that it has ulcerated into the gall bladder thereby producing a cholecystogastric fistula. The jaun dice, colic, and septic reactions accompanying a choledochal stone cannot be differentiated from those arrang with a choledochoduodenal fistula So confusing is the clinical picture that the phy sician seldom makes a preoperative diagnosis unless the fistulas have been madvertently discovered by the radiologist (2)

It has been pointed out that the formation of the internal biliary fistula might result in a sudden cessation of all pre-existing complaints (11). This is particularly true if the newly formed fistula effectively drains the static bile. While such fortutious circumstances are not usual they do occur. We agree with Puestow however that the formation of the fistula usually intensifies the patient's discomfort. Nausea vomiting chills, fever, jaundice and colic usually competthem to seek relief



presence of a chronic ampullary obstruction. b, A film taken 6 hour later clearly outlines the dilated chedeoda, and reveals barium in the intrahepatic radicals. Note the complete ampullary obstruction which is present. This finding has been constant in all cases of biliary intestinal fatula.

### DIAGNOSIS

The preoperative recognition of gastrointestinal bilary fistulas depends entirely on the radiologist in reviewing the literature Borman and Rigler found that of 267 fistulas only 86 were recognized preoperatively and in each instance the diagnosis was made by the roenigenologist



Fig. 4. This represents a reflux filling of the common bile duct associated with a duodenal uker. Note the ir regular appearance of the duodenal cap. The biliary radicals were not dilated. A film taken one hour later failed to outline the cholechous for the bardum has escaped back into the deodenum and passed into the lower intest all tract.





In their personal series of 24 cases they made a correct radiological diagnosis in but 37 per cent. Garland and Brown were able to make a diagnosis of gastrointestinal billary fistula in 5 cases which they studied and they assert it is the only method of making an accurate diagnosis.

The roentgenographic demonstration of in gested barium, or gas, or both in any agment of the bluary tract is presumptive evidence of a fixtulous communication with the gastrointestinal tract (12) The most important single finding is the presence of barium in the billary radicals. In only 2 other conditions does barrum have access to the bile ducta. One of these is in the presence of operative internal bilary, fistule and the other is where the barium regurgitates along a gaping common duct when the sphinder of Odd is relaxed. Fluroscopic studies usually afford an effect ive means of different tation.

Cholecystogastric fistulas are recognized by the passing of the barlum from the stomach



Fig. 5. a, The Ingrested barium outflies some storeach—a gavatic provinc frog and an Interpret radional cap. The learning passed from the decoderous list to be albedder these making the diagnosis of choleey-probadened fistals accountary to peptic pixer b. After the abbase is opened the distended gall bladder as highested als per crut diodrant. Others e the distended gall bladder as highest also per crut diodrant. Others e the distended gall bladder as the escape of the diodrant through the first hat he to decoderom. The common bile duct is ell visualization on stores were detected. Q. The choleey-proper the cholanging rate of the contract of contract needing for practically some of the deciders escaped through the ampulse of Vater int the deciders. This film confirms our contention that nots internal billiary fatula have concomitant paternatus the high performs processing the paternatus of the checked of the contract of the checked of the c

through the pathologic atoma into the gall habite (Fig. 1a.) After filling this viscus the contast medium flows through the patent cystic dat into the common ble duct (13). Usually its sphuncter of Oddi is so spasts and the paneras so swollen that they effectively obstruct the amplia of Vater thus preventing the barum from exaping muo the disodenum. This observation is

very important (Fig. 3).

Cholecystoduodenal fistulas present a different picture. The barrum first fills the stomach and then passes through the pylorus into the dood-num whence it gains entrance to the gall bladder through the fistulous tract (Fig. 5). The common bile duct is not visualized unless the cystic duct is patent.

In choledochoduoderal fatulas the baram will be seen to enter the duodenum in a normal manner and then flow through the fatula into the common bile duct (Fig 3 a). It is important to note that the baraum always fills the lower end of the choledochus first and after it becomes filled the barrum ascends along the common bile duct flows through the patent cystic duct, and fills the gall bladder Progress films invariably reveal the barrum to be incarcerated in the common bile duct 6 to 12 hours after the ingested harrum has passed from the duodenum into the lower intestinal tract (Fig 3 b)

Fortunately the reflux regurgitation of the barrum meal along the atonic common bile duct occurs very infrequently and presents certain identifying aigns (13) Fluroscopically the barrum can be seen to pass from the stomach into the duodenum, and as the duodenum becomes distended the barium slowly ascends the ampulla of Vater and completely fills the dilated common duct in a progressive manner (Fig. 4) The barn um however does not remain in the common duct but readily escapes through the gaping sphincter of Odds and goes along with the main barium meal into the lower segment of the bowels. This passage of bile is in striking contrast to the choledochal retention seen in all cases of gastrointestinal biliary fistulas.

The presence of gas within the lumen of the gall bladder or the regional bile ducts furnishes indisputable x ray evidence of a spontaneous gastrointestinal biliary fistula provided one eliminates similar gaseous shadows associated with an emphysematous cholecystitis (16) re gurgitation of gas along an atonic choledochus or through an operative fistula Rees (13) asserts that the reflux regurgitation of intestinal gases through an atonic sphincter of Oddi is so infrequent that it need not be considered. The uti lization of barrum meal usually provides accurate differentiation McCorkle and Fong (10) empha size the fact that in an emphysematous cholecystitis the gas, derived from bacterial action is usually confined within the gall bladder. In rare instances they were able to demonstrate bubbles of gas loculated within the walls of the gall bladder or confined to the pencholecystic structures. This finding indicates an extension of the phlegmonous process. If the films are taken with patient in an upright position one can occasionally detect the fluids in the lower portion of the gall bladder supporting an upper stratum of gas. Duodenal intubation may permit the recovery of Bacillus welchii organisms.

Borman and Rigler maintain that the radiologist is so accustomed to seeing gas in the duode num and colon that he frequently falls to con sider the possibility that isolated bubbles of gas may be incarcerated in the biliary system. If the gas is confined within the common bile duct it

assumes a tubular shape which corresponds to the anatomic position of the choledochus. This gas bubble maintains a constant position which is not the case with collection of intestinal gases. Confirmatory evidence can be obtained by the administration of a barrum meal

When the diagnosis of internal biliary fistulas has been established the radiologist should make an attempt to determine the patency of the intestmal tract (2) If the migrating stones are large enough they frequently produce an acute intestinal obstruction. Scout films may furnish indirect evidence by revealing the presence of gaseous distention loculated pockets of intestinal fluids, or by localizing the offending stones If the clinical picture is not that of complete obstruction the ingestion of a thin mixture of barrum is most helpful Such information is invaluable for the surgeon cannot hope to correct the biliary fistula while the intestinal tract is obstructed The obstructive complication requires primary con sideration

Cholecystcolic fistulas are usually identified by a barrum enema. If such enema does not out line the fistulous tract Faust and Mudgett found that the use of double contrast enema causes the insufflated air to pass through the patulous fistula so that the gas filled biliary system becomes visible

## SURGICAL MANAGEMENT

Patients having internal biliary fistulas are not good surgical risks. Dehydration acidosis toxemia. hypoproteinemia, all combine with the coexisting cholangitis, pancreatitis, and biliary obstructions further to depress essential functions of the liver It requires several days of a carefully planned preoperative regimen before these patients can safely assume the added burdens of an operation To ignore this essential preparation is to invite a high morbidity and mortality rate as indicated by reported cases.

There is no single operation which can be em ployed to correct all of these abnormal biliary fistulas The remedial procedures depend on the viscera involved, the size and location of the fistulous orifices, the presence of obstructive pancreatitis, cholangitis subhepatic abscesses and choledochal stones. Each case must be in

dividualized

Fishilas between the gall bladder and the gastrointestinal tract. Our plan has been to open the abdomen and make thorough palpatory exam ination to determine the location and extent of the provocative lesions ie gall stones peptic ulcers or new growths. The gall bladder and its

fistulous tract are not molested until complete cholangiographic visualizations of the entire biliary system have been made (Fig 5 b) Visual ization is quickly accomplished by inserting a No so rauge needle into the funders of the exposed gall bladder and evacuating its fluid content then about 30 cubic centimeters of 70 per cent diodrast is introduced into the gall blad der and an x my film is made. If the diodrast has escaped into the alimentary tract it clearly out lines the size and position of the fistula. A soft rubber-shod clamp is applied to the sinus tract and an additional so cubic centimeters of diodrast is introduced into the gall bladder As the contrast medium cannot escape from the gall bladder through the fistula it will be compelled to flow along the cystic duct and fill all the biliary radi cals (Fig 5 c) This affords an excellent roent genographic pattern of the bile ducts, noting stones, strictures, and choledochal obstructions. With such information the surgeon can intelli

gently plan the necessary corrective operations When dealing with gastric malignant new growths which have extended into the gall bladder the invasive process is so extensive that resection is out of the question. The neoplastic process has usually compressed the common bile duct and the cholecystogastric fistula affords the only escape for the static bile. To molest the fistula is to invite a biliary peritonitis. We have found that the prepyloric carcinoma effectively blocks the pyloric outlet so that the increased peristals is merely forces the gastric contents through the fistulous tract into the gall bladder thus inciting a fulminating cholangitis By the use of a gastrojejunostomy the gastric obstruction can be partially overcome and the reflux of the irritating stomach contents into the gall bladder is thereby reduced. One of our patients lived for 6 months after such decompressive operation, free from biliary distress, only to die of coronary occlusion.

If the cholecystogastric fatula has been caused by the migration of gall stoces, it is imporative that the functional status of the common hile duct be determined before the fatula is disturbed Should these visualizing cholangiograms demonstrate incarcerated cobedochal stones, which they all too frequently do then the common duct is opened and the offending calculi are removed Now that the choledochas is patent the gall bladder and the fatulous tract can be safely excited, provided the patient is condition warrants this additional surgery. In many instances the removal of the common duct stones still fails completely to remove the choledochal obstruction for the associated panceratus effectively occludes

the ampulla of Vater Dramage of the common duct by indwelling catheters is then region. Should the gail bladder harbor calcul they are removed and drainage of this viscus is institude. When postoperative chokangograms rered its choledochus to be patent, all catheters are moved (?) It has been interesting to observe that in many instances the cholecystogastic fistils has closed spontaneously. Removal of the gall bladder can be deferred until a more opportuse time.

The management of cholecystoduodenal fatulus requires special consideration. If produced by a penetrating peptic ulcer several plans on be followed. Gray and Sharpe advocate gastric resection combined with cholecystectomy and excision of the fistulous tract. Garland and Brown advise a gastric resection without molesting the gall bladder or the festula stating that the abnormal fistulous tract will close sponting ously. We have found that the perforating peptic ulcers are usually so large and so close to the common bile duct that resection of the ulca presents technical difficulties. Merely to remove the stomach does not relieve the concomitant choledochal obstruction and these patients are prone to die from hepatic insufficiency. It seems that the suppurative cholangits aggravated by the associated choledochal obstruction presents

the major problem (1) Our plan has been to individualize each care after complete cholangiographic studies on the operating table are made. In the presence of choledochal obstruction cholangitis, and impaired hepatic function the common bile duct is opened, offending calcult are removed, and catheter drainage is employed. The ulcer and fistult are not molested. Occasionally the excavating peptic ulcer may be so large that much of the duodenal content flows into the call bladder Thus fulminating cholecystitis, cholangitis, and pancreatitis are incited. While it is desirable to resect such ulcers along with the stomach the technical difficulties which it presents seem insurmountable in these ill patients. Likewise, the secondent inflammatory tissue around the base of the ukm precludes closure of the fistulous tract without producing duodenal obstruction. Under such circumstances, prolonged dramage by means of a choledochotomy and cholecystotomy has reheved the jaundice and permitted the uker to beal. Remedial gastric resections can be deferred

until the patient's condition improves.

Choledochodsoderal fittidar The vast majorky of choledochol-duodenal fistulas are produced by migrating choledochal stones or from penetrator peptic ulcers. Experience dictates that the

choledochus does not evacuate all of its calculi through the fistulous tract but some stones may remain in the common bile duct. These offending calculi may be wedged in the ampulla of Vater or incarcerated in the common bile duct above the fistulous ornice In one instance we found the common bile duct to contain 12 stones and the fistulous tract was completely blocked by a mi grating calculous thus accounting for the pa thent's intense jaundice Before the bilary tract is disturbed operative cholangiograms are em ployed to determine the number and position of the offending calculi (Fig 3) A choledon chotomy with removal of the obstructive atones invariably effects a cure. The fistulous tract is not molested, unless it harbors a stone for it invariably heals by the process of fibrosis Usually the stone laden gall bladder is removed at this

Penetrating peptic ulcers on the posterior wall of the duodenum present a much different probkem (Fig. 5) There is such an intense inflamma fory reaction that the resulting fibrosis usually produces a permanent stricture of the common bile duct. In selected cases it seems were to re move the ulcer and stomach and to transplant the resected choledochus into the jejunum If the patient's condition precludes these extensive operations a cholecystogastrostomy or cholecys. tojejunostomy maj suffice. Decompression of the obstructed common bile duct can be obtained by pulling a Levine tube from the stomach through the newly formed stoma so that its tip lies within the gall bladder lumen (8) Constant suction by the Wangensteen apparatus assures complete evacuation of the static bile This procedure has been described by us in a previous

Cholecystocolie fistulas Cholecystocolie fistulas are difficult to handle because of the suppurative cholangitis and hepatitis incident to fetal con tamination. The fistula usually communicates with the bepatic flexure of the colon and the in flammatory reaction surrounding the sames tract is so intense that the resulting mass may produce a partial or complete colonic obstruction One has but to review the literature to become con vinced that such patients do not survive a chole Systectomy resection of the colon and a choice dochotom) all in one stage. The primary consid eration is to relieve the colonic obstruction and prevent reinfection of the biliary tract. This can be accomplished by an obstructive ileostomy which effectively shunts the fecal current. The distal loop provides an excellent channel for trigating the ascending colon with effective

germicides which help to reduce the biliary tract infections. Sulfasuxadine will likewise reduce the bacterial flora of the intestinal tract and make subsequent operations safer. Under such con servative management the inflammatory reaction about the fistulous tract soon subsides, permitting bile to drain into the colon thus relieving the one to the patient a condition permits the fatula can be excised and the offending gall bladder removed Again, may we caution that it is essential to determine whether the common bile duct is patent if not, choledochotomy must be performed Usually the pericolic my famination will be minimal and the size of the fatulous ornice so small that it can be closed without resection of the large bowel. No attempt should be made to establish the continuity of the intestinal tract until the fistulous stoma is com pletely healed While this necessitates multiple operations a living patient is a happy reward

OBSERVATIONS The best treatment for gastrointestinal biliary fistulas 13 prevention This can be accomplished b) removing gall stones before they have time to on tempting goal unitate such undesirable complications Peptic ul cers which have not responded to conscientious medical therapy should be treated by gastric re section before they have had an opportunity to erode into the biliary tract. Farly diagnosis of gastric malignant new-growths combined with radical surgical treatment can minimize these in

There are several problems which must be considered in the surgical correction of gastrointestinal billary fistular First these patients must be carefully prepared to withstand the added burdens of anesthesia and surgical trauma Second the primary surgical consideration is to remove the obstructions of the common bile duct and institute drainage thereby alleviating the biliary stasis (1) Third corrective operations such as excusion of the fatula cholecystectomy or gastric resection can usually be deferred until the patient has made a good recovery from the decompressive operation on the bile ducts.

The mortality in the 13 operative cases was 30 per cent In each of these 4 patients who died extensive remedial procedures were carried out at the initial operation . This convinced us of the wisdom of using multiple operations particularly that of employing decompression of the common bile duct as the primary procedure Since follow ing this plan there were 8 patients with internal biliary fistulas which were operated upon without a death

## SUMMARY

1 Spontaneous gastrointestinal biliary tract fastulas occur in approximately 4 per cent of all patients requiring surgical therapy for disorders

3 Gall stones peptic ulcers, new-growths, and surgical trauma were the etiological agents in 272 studied. This includes 15 personal cases.

3 A preoperative diagnosis of gastrointestinal billary astulas cannot be made from clinical findings alone Careful roentgenographic diagnosus affords the only method of making an accurate preoperative diagnosia. Characteristic roent genographic findings in the various types of in ternal biliary fistulas are described

4. Cholangiograms, performed on the operating table, afford an excellent method of visualizing the gall bladder fistulous tract and entire biliary tree Cholangiograms determine the location and ramifications of the fistula and clearly depict the size of its orifices. Cholangiograms permit ac curate localization and differentiation of existing choledochal obstructions, whether caused by stones, strictures pancreatitis, carcinoma ulcers or periductal inflammation Such visualizing roentgenograms provide the surgeon with an accurate blueprint of problems confronting him.

5 The principles of corrective surgery are discussed with particular emphasis on the value

6 Thirteen patients were operated upon of whom 4 dred a mortality of 30 per cent. Oce patient having a cholecystoduodenal fixed an considered inoperable because of metastatic lesson to the lungs.

## REFERENCES

BIRT R.R., and HICKEN N FAPPENCE Super, a. BORMAN C.N. and RIGHE L.G. Superi ME.

and Richer L.G. Surgery Man.

J ELLARON E.L. and STEVENS, L.W. Am. J Sept. 1944.

51 587 302. FAURT D.B. and MUDDLETT, C.S. Ann. Int. M., 40.

5. GARLAND LIFL, and BROWN, J.N. Redickey MAA JS 54 59. GRAY H.E. and SHARPE, W.E. Ann. Sory 1945

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J.F. ROCKY MOUNTAIN M. J. 941, 35 POP-71QUEEN N. PERDENCE, COMP. Q.B. and Call.
Q. HICKEN, N. PERDANCE, COMP. 104, 753-464,
Q. HICKEN, N. PERDANCE, WHITE, L.B., and COLL,
O. H. Save, Con. Ober. 104, 753-464.

Q.R. Surg. Gyn. Obst., 942, 74 526 415.
o. McCourie, H.M. and Fono E.E. Sengry 1944.

1. POESTON (CB Ann. SERT, 104 15-104-105)
2. RAMER (CB Ann. J SUR 104-5, 1-104-105)
3. RELA, CB Ann. J SUR 104-5, 1-104-104
4. TAKET, M.L., and McKELL, M.C. Surp. Ch. K.
Annura. 114 7-144

America, 2017 7-717

15. SERVENOW, CA Am. J Roents, 044, 51 13-60

O. SWALE H. H. and MANUE, H. I. Am. J Sort page

# RUPTURES OF MALARIAL SPLEENS UNASSOCIATED WITH EXTERNAL TRAUMA

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T this time and for some time to come the frequent occurrence of splenomegaly among our soldiers returning from the many parts of the world may be con sidered a pathological complication of World War II Most of these large spleens are a secondary manifestation of malarna As our soldiers return from the various theaters and suppressive ata brine therapy is no longer required additional dagnoses of malana will be made and more cases of large spicens will be encountered The history will be important but careful examination of the left upper quadrant will reveal splenomegaly in many cases, and thus finding should make alert members of the profession to the potentiality of a higher incidence of spontaneous and traumatic rupture of the spleen. The enlarged spleen assumes greater surgical significance because it is more frable and fragile and also more vulnerable to trauma with resulting rupture and hemorrhage. This is emphasized in the report of Berger in 1902 where in 133 cases of traumatic rupture of the spleen 93 showed evidence of malaria.

More than 60 cases of apparent apontaneous rupture of the malarial spleen appear in the literature prior to 1895 None of these were operated upon, the diagnoses being made at autopsy During the last 50 years, from 1895 to 1945 47 cases have been reported For purposes of analysis, this has been divided into two 25 year periods namely 1895 to 1920 and 1920 to 1945 During the first 25 year period, which in cludes some of the early years in the development of abdomnal surgery, 12 cases of spontaneous rupture of the malarial spleen were lated in a re port by Leighton in 1921 We have undertaken to collect all the cases from the literature between 1920 and 1945 and are able to report 35 cases.

An analyzus of the 12 cases in the period be tween 1895 and 1920 reveals 6 deaths a general mortality of 50 per cent. Five patients were not operated upon, the diagnoses being made at ultopsy a mortality of 100 per cent Seven pa ents were operated upon with 1 death-a ortality of 14.2 per cent. Of the patients From the Department of Surgery University of Nebrasia

operated upon 3 were splenectomized without a death, and a were treated by tamponment with the death of 1 several days postoperatively from anura. In the 2 other cases only exploration with removal of blood clots was carned out as the hemorrhage from the spleen had ceased

An analysis of the 35 cases reported between 1930 and 1945 reveals 18 deaths, a general mor tality of 51.4 per cent. Fourteen patients were not operated upon, the diagnoses being made at autops) a mortality of 100 per cent. Twenty-one patients were operated upon and there were 4 deaths a mortality of 19 per cent. Of these 31 patients operated upon 19 were subjected to splenectomy with 3 deaths, a mortality rate of 15.7 per cent. Of the 2 other cases, one was treated by tamponment with recovery and the other was explored splenic fragments only re outer was exposed openic magnification only to moved, and death followed. Of the 35 cases, 9 patients had been inoculated with malaria for the treatment of lues and only I was diagnosed and subjected to successful splenectomy the other

The literature contains articles and case re ports on spontaneous rupture of both the normal and pathological spleen. As to spontaneous ruptures of the normal spleen we are inclined to agree with Roettig Nusbaum, and Curtis in doubting its occurrence and believe it should be placed in question. The case reports of Sussman (7 cases) and Zuckerman and Jacoby (21 cases) lend some arguments in favor of the normal spicen rupturing spontaneously but probably a more accurate statement would be that such spicens may not have presented discernible signs of abnormality or pathology at the time of exami nation because the rupture occurred at the site of abnormality destroying all evidence of previous pathology The term apparently normal spleen? might be more descriptive. The factor of internal strain or trauma is probably frequently associated with so called spontaneous rupture of the normal or pathological spleen. Such internal strain associated with muscular contractions or intra abdominal pressure changes occurring with coughing specific yawning vomiting effort at the stool and other body exertions must be con

sidered. These academic factors may not be appreciated by the patient as far as their relation to his complaint of abdominal disconficit or pain is concerned. These are not unusual acts, and event the most minute questioning may not always extract the admission of their occurrence.

The onset of spontaneous rupture of the ma larial spleen may be insidious and not present the picture of hemorrhage or shock in the early stages. To be alert to its possible occurrence in unsuspected situations will avoid many fatalities. Analysis and comparison of the two periods in the last 50 years reveal no improvement in the general mortality and this 50 per cent mortality is based mostly on failure of diagnosis. Certainly the technical phases of splenectiony have improved.

In the 3 cases reported in this paper a moderate degree of pain in the left upper quadrant, without a history of external trauma and without the classical signs of homorrhage or shock, would not have resulted in early diagnoses and immediate successful surgical intervention if attending personnel had not been acquainted with the frequent occurrence of splenomegaly among military men and the possibility of spontaneous rupture of the malarial spleen.

CASE t J N Malaria was first diagnosed in this case about January 943, in New Guines. He was treated with quinine, atabrine and plasmochi and during the following nouths had two recurrent ttacks. H returned to the U lted States on rotation in November U lted States on rotation in November 944, and ata-brine was discontinued. I January and March, 945 be had recurrent attacks and was treated with atabrine ing the second attack in March, he went to sick call in the morning and fainted while waiting. He was admitted to the hospital, Plasmodium vivax was demonstrated and atabrice was started immediately. He complained of alight upper abdominal distress. During the afternoon of this day he began complaining of more abdominal distress and weakness. About 30 that evening he collapsed while making an effort I the bathroom. H was again seen by a medical officer. There was increased upper abdominal pais and pain in the region of the left shoulder. The abdomes was distended and there was tenderness over left upper quadrant and lumber areas. There was no fluid wave or shifting deliness. The blood pressure was 65/30, pulse o4, hemoglobia 9 5 grams. With plasme and blood transferior, his general condition improved. Intrampacular atabrine therapy was started. The patient was operated upon under altrom order gas-ether-oxygen anesthesia and the sphen was removed. The peritoscal cavity contained free blood and clots. There were three definite points of rupture on the convex margins of the spicen. He made as unevential recovery

Pathology: The spices weighed 315 grams and was very friable. Serial sections showed small infarct. Effects scopic examination showed focal necrosis of mahighlan believe Mehadles made.

bodies. Maharial paradies were seen. Casz z. H. C. This patient developed malaria in the South Parific in September 1944. He continued on suppressive stabilities therapy until the day of administration it boughtal months into Tow week prior to entering the bospital, he had been constituted and had had no head morement. On this morning, he went to the toller, unless severely and at this time noticed a sucker, naive seen pain leat to the left of the expansion and code to he costal margin. Following this, he felt assemble as recibed several times. He left little weak not remarks had bed to rest a little longer. In the afternoon, became a continued shoboulest pain and marked distress to for region of the left shoulder he entered the hospital.

Examination revealed a soldier in apparent distress His abdomen was quit rigid, more so on the left, and there was marked tenderness in the epigastrium and beseath the left costal arch. The blood pressure was 100/54, house globi I grams with 3,0 0,000 red blood cells per care centimeter Platelets were 140,000 Prothrombia time was S seconds for the patient and 7 5 for the central Lavier of his history and the clinical findings, immediate openion was advised. Intransuccials rabeline therapy was sturd at once. On arriving in the operating room, his blood presented the central contraction of t had been typed so blood was available in few minutes and transferior was given. The blood pressure returned to 90/40 and under nitrous coids gas-ether-oxygen and thesia, the spicen was removed through a transverse shedominal incision. When the peritoneal cavity was opened, large amount of fresh and clotted blood—as esconstruit The spices was pulpated but no break in the capsule was found. Adhesions were very firm to the displaym. The spienic pedicie was gently exposed and a small vets, show t millimeter in diameter, was seen to be bleeding rather freely as a clot was lifted from this area. With the applica tion of a clamp to the velo, bleeding stopped. No break to the aplenic capsule could be ascertained before remoral of the enlarged spicen. There were several areas of subcapa-lar hemorrhage. He made an uneventful recovery led a transfesion was given on the third postoperative day be-

cause of o gram hemoglobia and a 1 per cent hematoch.
Pathology The spilets weighed yo grams. On sicre-scropic section, the germinal centers of the hyperpastic malpighian bodies were partially accordic. Creating forms and schizosta of Phasmodium virus: empression of the control of the contr

i the crythrocytes.

CASE 3. C. B. This patient had his first attack of malaria in North Africa and remained free from recurrent activities. as long as he continued to follow the suppressive state in therapy religiously. On several occusions, he contint tok-ing his daily tablet and within a matter of ceks in sechave recurrent chills and fever On one occasion when is had discontinued his therapy for some days, he lad the opportunity and desire to eat an unusually heavy sel.
That night he awakened about 100 a.m., left senseated, and induced woulding by inserting a finger in his throat While vomiting, he felt a severe, stabblog tale ander the left costal margin and felt very weak on returning to its cot. He was smalle to get much rest because of pale and the following morning reported for sick call. Became a not make any manager provided for sick call. Because pain and traderness under the left contail arch, he was seen into the bospital. On cananization, as calarged and of trader spices was applicated. There was tensionens in the opligatifum and left lumbur regions. Pulse was of spirallic blood resources. All the state of the provided by the containing the contain systolic blood pressure of, distolic 64, hemoglable 15 grams with 4, 200,000 red blood cells. He had an attack of chills and fever soon after reaching his bed, and by the time positive malarial smear was reported. The strict remained very uncomfortable and stated that he isk appelling to the state of accounting was pushing out his ribs. During the seri-leours, his pulse increased to r s, the blood pressure fro-ped t 60/60. With the history of malaria and the large-very feeder subsecutives. very tender spicen with mostle rigidity more parted over

left rectus and lumbar regions without unological symplett rectus and immust remous without unsequest symp-ions or positive prological findings by 2-ray the discoods of a ruptured spicen was made and operation advised or a ruptured speem was made and operation advised Through a transverse incidion the peritoreal cavity was laroupu a transverse manuar the pertument cavity was no evidence of free blood. The apleen openio there was no especial to the proof, the special was greatly enlarged and further emounts revealed a maswas greatly emerged and nutruer caposure revenue a mas-sive subcapaular bematoma. While manipolating the ave succeptual penations, while manipulating the capacile implanted and a large spices for removal, the capsule supported and a surfer bematoms was partially released. At this moment, the pa tentation was partially research are thus mountain the basome general common occasion parter pour puise occasion secta and blood pressure dropped. Plasma was statistical and be accorded immediately. This was followed by a finite occasion. he taperated immediately 1 and was inflored by a note blood, a donor having been selected before operation. He

sage an according recovery.

The pathologist reported a malarial spicen with par asites present.

Three types of rupture have been demonstrated in these cases—namely rupture of capsule with free bleeding subcapsular rupture with massive hematoma development beneath the capsule and rupture of a vein in the aplenic pedicle associated with several small subcapsular hematomas.

An analysis of these cases reveals that the pa tents began having rather sudden mild to moderately severe pain in the left upper quadrant with radiation varying to the epigastrium left lower quadrant and lumbar regions. The onset may occur wille the patient is apparently inactive or while making some alight exertion Nausea or vomiting may be associated with this distress and there may be some feeling of weakness and a de sire to rest and remain quiet. Two of these pa tients had a positive kehr's sign with pain in the left shoulder to which one should attach great agnificance in a suspicious or known case of aplenomegaly as it usually means leakage of blood beneath the left side of the diaphragm. Rallance s sign with percussion duliness in the left upper quadrant is not so important as to indicating blood in this area because of the all ready enlarged spicen. However it is againfacant as to the presence of a large splcen and the posshilly of spontaneous rupture. Tenderness and ngidity on the left side including epigastric and lumbar areas are most significant if there is a history of malaria A history of overseas service with prolonged suppresive atabrine therapy should sert one to malaria even in the face of no history of chills and fever Pulse blood pressure and blood picture changes may not be present in three cases in the early period. With some the typical picture of hemorrhage and shock in addi tion to a suspicion or knowledge of splenomegaly can readily establish the diagnosis.

In the differential diagnosis, perforated or penetrating peptic ulcer ruptured gall bladder mesentene thrombosis, volvulus, renal colic, disphragmatic pleures pancreatitis and coronary

occlusion must be considered, but if the history can relate the heretofore mentioned facts regard ing the possibility of malaria and splenomegaly a prompt and probably correct diagnosis will be made immediately or after a few hours ob-

It is very advantageous in these cases that proper medical management be instituted im mediately on diagnosis and, if possible, before the patient is operated upon A chill occurring be tween the period of diagnosis and splenectomy may not only prove hazardous for the patient but embarrassing to the surgeon and the anesthetist. Anesthesia and surgery are both factors which lend to precipitate recrudescence of malara Strong in his text, cites Manson Baker report ing a reduction of red blood corpuscles by as much as one million per cubic millimeter with a sıngle chili

Quinine dihydrochloride by intravenous route has long been advocated for malarial crises be cause of the rapidity with which a high blood level is obtained. However Hudson has empha suzed the fact that the peak level of quinine used intravenously is over within 30 minutes and that by large intramuscular doses of atabrine a quick more sustained therapeutic level is attained. An effective plasma concentration is reached within 15 minutes and maintained 6 hours by a 0.4 gram intramuscular dose Consistent with this reason ing and in an attempt to avoid the depression associated with large, rapid doses of quinine ata brine dihydrochloride was selected for treatment in these cases Upon diagnosis and before the patient was operated upon a 0.4 gram dose of ata brine dihydrochloride was given intramuscularly half of the dose into each buttock. Thereafter 0.2 gram were given intramuscularly every 8 hours until the patient could tolerate oral medica tion Usually this occurs within 24 to 72 hours postoperatively and atabrine o 1 gram is given three times daily for about 6 days or until 28 grams have been administered. Sodium bicarboande was employed in 1 gram doses three times nate was employed in a gram door direct was daily with the oral atabrine. Each patient was continued on suppressive atabrine therapy (0.1 emergency in these cases, one or more transfusions of whole blood supplemented each opera lusions of whole business supplementation where the rationale of this treatment is to prevent the occurrence of an inopportune chill before during or immediately following the operation to prevent or overcome the cacheria which occurs with the acute malarial attack and to prevent recrudescence of clinical malaria dur ing the convalescent period

The treatment is splenectomy and if tampon ment and auture have no place in the fracture of the normal spleen, they certainly have no place in the management of the more friable malarial spleen. STUMARY

I Splenomegaly is common among military personnel who have served overseas.

- 2 Apparent spontaneous rupture and trau matic rupture of the spicen will be more frequent because the enlarged spleen is more friable and more vulnerable to external trauma and internal STRIDS.
- The apparent spontaneous rupture of the spleen is probably associated with some form of unappreciated or unrecognized external trauma or internal strain.
- A. A series of 12 and a series of 15 cases of spontaneous rupture of the spicen are reported.
- 5 Three additional cases with recovery follow ing splenectomy are reported.

There has not been improvement in the general mortality rate for spontaneous runture of the malarial spicen in the last 50 years. The ferre remains at about 50 per cent and is based on

failure of diagnosis or delayed diagnosis. 7 Splenectomy is indicated. 8 It is important to institute antimalical

therapy as soon as diagnosis is made and before operation if diagnosis has been made.

o Atabrine is the drug of choice.

## REFERENCES

- BERGER, H. Arch. klin, Chi 001 63 768, 86c
- 1 DIAMER, H. ATTH. RIB. CM 907 63 708, 805.
  3 HOTSON E. H. U. N. A. M. Bull 915, 45 57-9
  3 IARGETTO, I. C., NURALUE, W. D. and CRIBE, G. M.
  AM. J. SURP. 943 59 707-5 5.
  5 STROMO, M. P. Silita Diagnosis. Prevention and Trail-
- ment of Tropical Discusca, 6th ed. Philodelphia. Blakiston Co., 04s. 6 ZOCKERMAN, L.C., and JACORE, M. Arch Surg 1823. 34 9 7-928.

## EXPERIMENTAL SURGICAL PULMONARY COLLAPSE

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ARIOUS extrapleural strapping procedures have been introduced into the field of thoracic surgery since the initial report by Tuffier (95) in 1891 These procedures have all arisen as a result of a demand for a simplified operation which can be used in poor risk or complicated cases requiring collapse From a theoretical standpoint the operative procedure is sound in that relaxation in all directions can be secured by an extrapleural freeing of the lung just as in an intrapleural pneu mothorax. Many present day surgeons combine an extrapleural dissection with thoracoplasty for the same reason and find no objection to a combination of operations (Semb)

Extrapleural pneumolysis as a primary procedure, however has met a great deal of criticism, more so in this country than abroad. The criticism appears to be based not so much on the operative approach to the problem as upon the frequency of complications which arise and be cause these complications are so difficult to manage Extrapleural pneumolysis, unlike intra pleural pneumolysis, leads to the creation of a nonserous lined space with a distinctively different physiological reaction. The same end-results may be obtained in so far as collapse of the lung is concerned Churchill (16 17) has stressed the fact that extrapleural pneumolysis, in contrast to intrapleural pneumothorax is an irreversible procedure and should be considered as such. In an attempt to make a reversible procedure out of an irreversible one, air was utilized to maintain the space and met with disrepute. The threat of infection was forever present and sooner or later the air had to be replaced by oil or the space had to be obliterated by a thoracoplasty (Dolley Jones, and Skillen 18 19) Fundamentally then it can be said that the operation of extrapleural pneu molysis is sound but the methods of maintaining the space are unsatisfactory. With this considera tion in mind experimental studies were begun in the Fall of 1943 to discover a material which could be used to fill an extrapleural pocket which would be nonirritating to the tissues, and which would permit the body fluids to organize forming a permanent fibrous pack. An ideal

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material was found in methyl methacrylate commonly known by its trade name of lucite

### HISTORICAL.

Extrapleural pneumolysis is not a new opera The procedure was first described by Tuffier (95) in 1891 The first recorded operation in this country was performed by J B Murphy in 1808 In 1910 Tuffier (99) reported 3 cases and noted the need for some material to maintain the collapse In 1914 (97) he reported 11 cases in which the cavity was filled with the patient sown fat. In this series there were 4 deaths and only 1 cure. Bull also used fat in o cases with healing in Morrison Davies reported 4 cases improved by filling with fat. Fat was soon discarded as a filling material because it was too difficult to obtain in an emaciated person because it was too

soft and because liquefaction occurred

In 1913 Baer (7) recommended extrapleural pneumolysis because of its simplicity and because it avoided extensive skeletal operations. He em ployed a paraffin mixture, consisting of 75 cubic centimeters of parathn with a melting point of \$8 degrees centigrade and 25 cubic centimeters of paraffin with a melting point of 50 degrees centigrade plus I gram of bismuth carbonate and oc gram of violorm. The paraffin mixture was sterilized by vapor sterilization on 2 successive days for 1 hour and warmed before using. The mixture hardened at body temperature and met the chemical requirements better than fat. Sauer bruch (79 80) was first to carry out a large series of cases with this material and Nissen (6, 66 67 68) and his co-workers, pointed out indications and shortcomings of the paraffin pack. Complete obliteration of the pleural cavity is of prime necessity since the obliterating material causes a marked foreign body reaction which combined with gravity may result in a tear of the parietal pleura with penetration of the free pleural cavity The same process leads to a necrosis of the lung overlying adjacent thin walled cavities. This most dreaded complication results in a severe in fection and demands immediate removal of the pack. The pressure necrosis of the lung overlying thin walled cavities is attributed to the interruption of venous and arterial communications from the thoracic wall through the pleural adhesions



Fig. Roentgenogram of chest indicatopsy of rat No. 7 showing collapse of right lower and middle lobes 9 weeks

after insertion of methyl methacrylat mold into the pictural cavity

the blood supply from the lung to this area having already been interrupted by the cavitation. Too thits attention has been given to the foreign body reaction created by parafin. It is our opinion that this is of greater importance than the interference with the blood supply.

Baer (78,0) recommended performing the operation through an anterior incision. Nissen preferred a posterior approach and limited the mass to 500 or 600 cubic centimeters. Head has recently advocated the paraffin pack for closure of large apical cavities which are prone to retreat against the spine or mediastinum and remain patent despite extensive thoracoplasty procedures, including removal of the transverse processes and costal cartilages. He observed a higher percent age of favorable results than when thoracoplasty was performed as an initial operation. He also advocated the initial paraffin pack as a less dangerous procedure with a good chance of cavity closure. Furthermore he felt that thoracoolasty performed after initial paraffin packing was more ant to be effective and attended by less complications because of the reduction in size of the cavity and stabilization of the mediastinum. He reported at patients selected as being suitable for initial paraffin filling. Of these 31 24 had conversion of sputum from positive to negative. Three were improved 2 were worse and 2 died. Sixteen had large apical cavities, 6 of which were converted by packing alone and 7 others by packing and thoracoplasty In 4 cases the paraffin perforated the lung and had to be removed.

Schlange, Sauerbruch (79,80) Casper and Matson (54,55) advocated compression with an extrapleural pack of plain gauze. Matson (54) in 1938 in a preliminary report advocated an extrapleural gauze pack in apical and subapical soft walled cavities of recent origin, preferably less than 4 to 5 centimeters in size with a patent bronchus. In general he employed the gaure pack in those cases in which extrapleural pneumothorax would at that time have been the logical procedure to utilize that is, in those patients with tuberculous cavities or areas of infiltration is either one or both upper lung fields. The collapse was selective in character and he felt that the postoperative management was relatively simpler than extrapleural pneumothorax. Of 81 patients reported 54 had conversion of the sputum, 15 were considered clinically well after the pack was removed There were 4 deaths none directly attributed to the operation. Infection occurred with the formation of a purulent exudate in 18 cases and in 16 removal of the pack was necessary Removal of the pack was followed by thoracoplasty in a large percentage of these cases.

Shivers, Architaid (4,5) Coffaerts and Winther (34) Sebrechts, Alexander (2, 3) and Churchill (10 17) have advocated filling an extra pleural cavity with pectoral music detached from the chest wall and humerus. The stread of coracoid attachments were preserved with the main blood supply in order to oliminiat stropty of the muscle Archibald (4,5) Buther, Schner Douglass, and Merkel combined muscle packing



Fig. 2. Roentgenogram of chest and autopsy of rat No. 16 showing collapse of upper 3/ of right lung 8 weeks after

insertion of methyl methacrylate mold into the pleural cavity

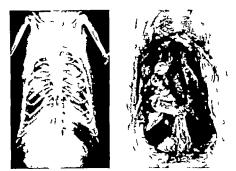


Fig. 3. Roentgenogram of chest and autopsy of rat No. 7 six months after insertion of ¼ inch methyl methacrytate balls into the pleural cavity. The balls are still free in the pleural cavity.

with thoracoplasty removing the anterior por tons of the second third and fourth ribs while Goffaerts and DeWinther performed an extra pleural pneumolysis through an anterior approach resecting a portion of the third rib and pulling the pectoral muscle through the first intercostal space Alexander (3) and Lilienthal (51 52) advised a supraperiosteal and subcostal filling of muscle performed through a curved

antenor incision in preference to an extrapleural packing. In this modification the periosteum of the first three or four ribs is stripped free and is displaced medially by the pack. Re-expansion is prevented by regeneration of the ribs in this location deep in the thorax. The advantages of this modification over extrapleural stripping is that there is less danger of tearing the pleura and the extent of the pulmonary collapse is readily



Fig. 4 Photomicrographs of the pieura and lung in contact with methyl methacrylateria, left, weeks, b, 6 months. X195

controlled by the amount of periosteal stripping and is not limited by the presence of tough extra pleural adhesions. The indications for supra periosteal and subcostal packing are extremely limited. The limitations are much narrower than those of extrapleural pneumothorax and more dosely approach anterior thoraccephasty in opera tive technique in performing thoraccephasty it is doubtful if any case of pulmonary tuberculosis is more suitable for this procedure.

Gwerder Jessen (46) Miller and Oughteron and Harvey (70) used an inflated rubber balloon inserted in the extraplieural space for the treat ment of tuberculous pulmonary cavities. Haspit, Harvey and Oughterson (40) used a similar balloon placed supraperiostically for the treatment of nontuberculous cavities. This temporary collapse was maintained until the patient a condition permitted a thoracoplastiv or an unroofing operation. Infection occurred in the majority of patients, and the postoperative management was complicated.

The maintenance of an extrapleural collapse by means of ar refills is of relatively recent inception. Mayer in 1913 first demonstrated that it was possible to do a complete extrapleural stripping of the lung including the pleura over the dapphragm. Jessen (47,48) and Ricckenberg reported a series of successful cases. In 1923 Romanis and Rivoere (74) reported an extensive extrapleural stripping with re-expansion because of delay in matriating the refills. In 1932 Jacha and Sebesty en advocated extrapleural preumothorax in conjunction with an unsuccessful intrapleural preumothorax. Serious attention was not given to extrapleural preumothorax until the poblications

of Graf (35,36) Schmidt (82 83) Moraldi, \max (65 66 67 68) Michelmon and Zormi between 1933 and 1938 In 1936 Graf (35,36) reported 107 cases with favorable results. In 1037 Schmidt (83) reported 155 cases and increased the number to 544 by May of 1939 (Adelberger Thesa, Bellinger Gaubatz, and Sauer) Large senes of cases did not appear in the American literature until 1938 (Overholt and Tubbs, Belsey) At first received with considerable enthusiasm it immediately became apparent that air was not an ideal material for the maintenance of an extra pleural pocket. Unlike the serous lined intra pleural cavity the extrapleural space was maintained with difficulty, complications were frequent and re-expension failed to occur following discontinuance of the refills. The space then had to be obliterated by thoracoplasty or converted to an oleothorax with its ever attendant dangers Dolley Jones and Skillen (1819) m a compre hensive survery reviewed the results of over 2277 cases gathered from 27 clinics where extrapleural pneumothorax had been in use for more than a years. The results varied with the character of the patients selected for operation. Conversion of the sputum occurred m only approximately 53 per cent of the patients and 11 per cent were dead Early conversion of the pocket by means of oleothorax was advised in order to control and maintain the collapse, to reduce the expense of refills, and to minimize the chances of infection. On the whole the report was not favorable

## EXPERIMENTAL STUDIES

In the search for an ideal substance to be used as a packing material for an extrapleural space certain fundamental considerations were appar

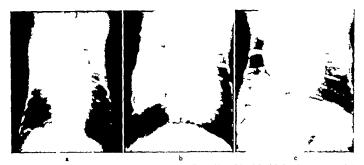


Fig. 5 Roentgenograms of chest of dogs abowing a, collapse of apex, b, collapse of middle portion, and c,

ent. Since the material chosen was to be left in the extrapleural pocket permanently thus establishing an irreversible collapse comparable to thoracoplasty (1) the material should be nonunitating to the tissues, both in the immediate postoperative period and in later stages (2) it should be noncarcinogenic and nonantigenic (3) the material should be of light weight so that a large quantity could be introduced without danger of penetrating the pleural cavity and lung (4) it should be insoluble and not subject to chemical change in the tissues (5) it should offer little if any resistance to x rays (6) it should be capable of being premolded in such a shape that varying sized cavities could be filled through a relatively small incision

The various metals and nonmetals which came under investigation included aluminum tan talum vitallium preserved cartilage, stainless steel celluloid and methyl methacrylate. The metals, especially tantalum and vitallium, were considered ideal in so far as the tissue reaction was concerned but were discarded because of the weight and expense. Celluloid and methyl metha crylate are both relatively inexpensive and light Both have been used in orthopedic surgers and in neurosurgers to repair bone defects but nothing to our knowledge has been reported concerning their use in thoracic surgery Celluloid was first used by Fraenkel in 1890 for the repair of cranial defects and gained wide popularity for this purpose in the early part of the century Experimentally the tissue reaction has been shown to be slight. Immediately after the

operation a serosanguineous exudate formed

collapse of lower lobe of the right lung by means of methyl methacrylate balls inserted into an extrapleural pocket.

about the celluloid which frequently required aspiration. Six days after implantation the celluloid was surrounded by granulation tissue containing newly formed vessels and polymorphonuclear leucocytes. After 4 weeks laminated connective tissue still infiltrated with inflammatory cells was present. Nev reported 300 implants with but 5 infections. If infection did not occur encapsulation took place. Several operators have found little reaction after several years. Funke (29 30) however found that the celluloid lost its elasticity became brittle and crumpled, and chemical analysis showed that camphor was lost from the implant. If has therefore been discarded

Methyl methacrylate is an acrylic resin manu factured from acetone hydrogen cyanide and methanol in the presence of sulfuric acid. The end product is a clear liquid called methyl metha crylate monomer Under exacting chemical and physical conditions polymerization takes place giving rise to the clear solid form which is mar keted commercially under the trade names of lucite crystallite, plexiglass, and vitarilic. the finished form methyl methacrylate exhibits a tensile strength of 6 000 to 9,000 pounds per square inch. It is thermoplastic and softens when heated to temperatures above 220 degrees Fah renheit (ros degrees centigrade) It absorbs only a small amount of water without changing its chem ical composition. Methyl methacrylate is soluble in esters, ketones ethylene dichloride and chloro form it is not affected by weak acids or alkalis

Methyl methacrylate was first used in dental prosthesis and found to be nonirritating when in contact with the mucous membranes over a long



Fig 6. a, Lung f dog No. 5 removed at topsy 5 months after extrapleural packing with methyl metha crylat balls.

period of time. Kleinschmidt in January, 1940 was the first to report its use in experimental animals, to repair skull defects. In the first lew days the plate was found to be surrounded by a small amount of serum which rapidly organized, forming a definite capsule of hivaline connective these. There was little inflammatory reaction and no foreign body response even after the presence of infection. Kahn believed the material could be safely used at the time of a primary repair of a perforating wound of the skull, and even in the face of infection the plate need not be removed.

With these studies in mind, methyl methory late appeared to fulfill the qualifications of a satisfactory filling material to maintain an entra pleural collapse of the lung Animal experiments were begun in November 1044 to determine the reaction of methyl methacrylate implanted into the extrapleural space and into the pleural carrie Operation was performed on 30 adult rate and 10 does. In some of the rats collapse of the individual lobes was secured by implanting a mold of the lobe to be collapsed directly into the plean cavity (Figs. 1 and 2) In other rate a portion or the entire pleural cavity was filled with 1/4 inch balls introduced through a small opening in the chest wall (Fig 3) The operation was performed with positive pressure anesthesia under stelle precautions. In the postoperative penod fre quent x ray films of the hings were taken. The rats were killed at intervals of from 10 days to 8 months and postmortem examinations were made. A little effusion was demonstrated follow ing the introduction of the methyl methacrylate into the pleural cavity but the animals tolerated the material well and except for some shortness of

breath in the first few days, activity was normal. Histological studies of the pleura and mode is not live in the property of the pleura and mode is not live in the property of the property of the line (Fig. 4). In 26 rats at electasis was present without inflammation. In 4 rats a poeumono process was present with multiple small abscesses confined to the attelectatic portion of the long Empyrems was associated with 2 of these cases (2) A minimum of pleural reaction characterist in the first few days by the formation of a small amount of clear fluid around the implants accompanied by a swelling of the metodelism and

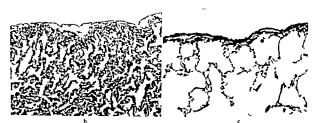


Fig. 6 b Photomicrograph of section through collapsed rea of lung compared tith normal lung

proliferation of the connective tissue in the submesothelial region. The mesothelial lining of the pleurs remained intact in most instances and a few large cosmophilic staining cells resembling mast cells were observed in the submesothelial region. There was no round cell infiltration or guant cell formation (Fig. 4)

In 18 of the rats the fluid around the implants became organized into a thin film of hyaline connective tissue infiltrated at the peripher, with newly formed capillaries and a few chronic in fammator, cells. In 10 rats the implants were still free in the pleural cavity at the time of autopsy (Fig. 4) Two rats died on the fourth and twelfth postoperative days and autopsy revealed empyema with the formation of abscesses and granulation tissue around the lucite balls and in the underlying lung tissue.

An extrapleural collapse was performed on 10 healthy does which were then followed clinically and roentgenographically for 6 to 8 months (Fig. Approach to the extrapleural space was easily secured between the ribs but because of the tissue paper character of the parietal pleura its close attachment to the periosteum of the ribs, and its extension high into the neck, classical extrapleural stripping in the dog was found to be extremely difficult. Dissection of the inner periosteum from the rib was frequently necessary The space when developed, was filled with solid 34 inch methyl methacrylate balls. In 8 of the 10 dogs a serosangumeous exudate appeared within 48 to 72 hours postoperatively resulting in moderate swelling of the operative site and requiring aspiration in 1 dog Infection in the operative incision occurred in 1 dog requiring open drainage. Healing eventually occurred how ever with penicillin therapy and without removal of the lucite balls. There were no deaths in the series of to dogs and no evidence of any systemic reaction after the immediate postoperative period.

Autopsies revealed a localized atelectasis of the lung adjacent to the extrapleural pack (Fig 6). There was a moderate thickening of the mesothelial layer and microscopically some proliferation of the submesothelial connective tissue of the visceral pleura similar to that observed in the rats. Adhesions between the visceral and parietal pleura were absent in 7 of the dogs. In 3 fine string like adhesions were present. The methyl methacrylate balls in the extrapleural space were fixed in a dense mass of hyaline connective tissue (Fig 7).

### EVALUATION

Methyl methacrylate introduced into the pleural cavity and extrapleural space of experi-

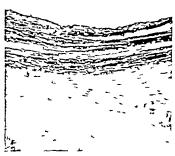


Fig. 7 Photomicrograph of connective tissue surrounding the methyl methacrylate balls inserted into the extra pleural space ×127

mental animals is well tolerated. It is light weight, readily available, inexpensive and non irritating. Its reaction is characterized by the production of a thin capsule of hyaline connective issue.

The adaptation of methyl methacrylate to clinical surgery is opening new horizons. At the present time it is being used to repair cranial defects and in reconstructive surgery (100 72) Our studies have been concerned with its adapta tion to thoracic surgery. At the present time 8 patients with pulmonary tuberculosis have been operated upon methyl methacrylate has been used as a filling material to maintain an extra pleural collapse. The results in these cases have been sufficiently gratifying to warrant its continued use and will be discussed in a later paper The use of this material we believe will save from discard an operation which has interested surgeons since the procedure was first described in 1801 It fulfills a need not satisfied by paraffin, muscle, fat, oil gauze or air It adds to the surgeon's armamentarium a single stage procedure which because of its simplicity can be used in complicated and poor risk patients with pulmonary tuberculosis.

### SUMMARY

Experimental studies utilizing methyl metha crylate implanted into the pleural cavity and extrapleural space of 40 laboratory animals have been presented. The reaction of the pleura and extrapleural tussue has been demonstrated. Its

use is suggested in the treatment of pulmonary tuberculous

### REFERENCES

ADLIBITATE L. Deut. Tuberk Bl 939, 7 117 2 ALFEA DIR, JOHN Arch. Surg 1034 19 538. 3. Idem Collapse Surgery of Pulmonary Tuberculosis.

lightimore Charles Thoma 1037 4. ARCHIBALD, F W Im Rev Tuberc out 4 818.

5 Idem. Am. J Surg 1924 28 17 6 BARRING R. J B RCLO 1 R. D and ALBERTINGO,

J. B. Rev. rgent neur psiquiat Rosario, 1941 6 2 Bol. Soc cir Rosario 194 8 299. Bur G Minch med Wechr out 60 55

8. Idem. Zach Tuberk., 10 5, 23 200.

6. Idem. 24th 1907 1, 10 5, 23 500.

9. Idem. Minch med. Wisch 911 65 572.

0. BALLY C. F. [ Thorac Surg. 912 11 326.

11. Ballas, J. F. Arch. Surg. 940, 41 4414.

2. Belli ora. H. Deut. Teberk. Ill. 1918.

1014 4 81 13. Bitar R. J Thorne Surg 1918, 7 575 4. Brown 1 M 1rch, Otola Chie 194 Irch. Otola Chic 1044, to 170.

4. Brown A M. Arch, Ohela Chic 1944, 10 1795. BUTLER I F. SAL V. R. M. A. IDNOLA S. R., and
MERKAL, C. G. J. Thorac Surg. 938 8 9316. CHURCHILL, F. D. England J. M. 1931 203 519-

7 Idem Am Rev Tuberc 010,41 4 t.
8 Douly I S Jovie J C, and Skilley J J
Thorac Surg 030, 8 64

Idem. Am Rev Tubert 940, 4 4 3. Phow gist I and Rocur P Presse med 20. DUM RIST I 930,

35 20 2 ELORSHER L. J Thorne Surg 032 1 672. 22. HILLS WM, L. O. When klin. Wach that

4 825 Ibid 801,6 41,

24. FRANKELL A. Wien, klin Wachr 1800, 3 475. 25. Idem. Zbl. Chir 1894 22 47

Idem. Deut Ges Char 895 24 85.

Idem. Arch. klin. Chir Ros en 407 Fart R. vov. Wen kli Wich & 194, 7 40.

to, FUNKE P Deut Gen Chir ook.

30. Idem Zbl. Chi q 5.4 17 31 G UBATZ, E. BEIT Klin. Inberl., 03% 91 20 32. GEART P Am. Rev T berr GEARY P Ass. Rev T bere 012 46 646.
Gettler C W Sliver E. W Deut, Res 1018.

8 381 34. COPPARATE and D WINTERS Presse med 027

Cu r \\ Deut. med \\schr 936, 6 67

35. Cu r W Deut, med Wischr 936, 6 67 36. Iliid., 63 4. 37. GRAN M, F. SINGLE J. B. LLON H. Surgical Dis-

cases of Chest Philadelphia Lea and I biger 935

38. GWEEDER J. Münch med. Wisch 9 J. 60 7663. 39. HABART J. Wien kli. Wische 900, 3 700. 40. HAIGHT, C. HARVEY S. C. and OUGHTERSON A. W.

Late J Blod of 3 35
IL NT-CI VON M II Grennerb, Med. Chil

34 320
42. H AD, JURON R J Thorac Surg 9
43. Hi TURETORNUR, H Wien LED, Wach 937 6 49 8pr 4 193

Jacana, L. Lotta tuberc 912, 3 50
JANEEL, C. I Deut Zachr Chir 976, 97 8
JESSE I Die Operative Behandlung der Lungen

tuberk lose 3d Leipzig Curt Kabitasch 193 47 Idem Die Behandlung der Lungentuberk lose

Leupeng Curt Kabitzach or 48. Idem Locs ensteine Handbuch der gesamben Tuber kulose Therapie P Berlin and Wen 49 Urban & Sch araculers, que

49. Kurs, 1 1. Proc. R. Soc. Lond., 1945, 15-191.

50. Kill scrinior O Chrure, 641 13 23, 57 23, 51 Littly Trivil, H. Surg Cha, N. America, 1914, 8, 115 52 Ideas Am. J. Surg, 1911, 14 375
53. Lit K. I. Wen, seed, Userb. 895, 45 950. Marroy R. C. Bull. Im Acad. Tuberc. Physician

1938.

Idem Am. Rev Tubere 1932 43 744. MAYER L. Heut med. Weeker 9 2 39 2347 50. M TIR, II Inn. Surg Sos. 22 508.

MICHELSON F Tuberkulose Münch, 1935 3 31. MILLER F Collected Proceedings of the Tenni Surgical Society 1910, Feb

Mossam V. Lotta ( bere 933-4 53-Mosoo, O. Traitement chirargical des carross

tuberculcuses du poumons. Paris Louis Aractie 69 Idens J Thomas Surp of \$ 100
63 Jirahyr J B J Sun M Su 50 31 551
64 V F K V Bu J Surp on 44 504
65 V F K V Bu J Surp on 64 1964
66 Idens Surp Cyn Obed og 1 5 714
66 Idens Surp Cyn Obed og 1 5 714
67 Idens Deut Z 6th Chi 911 23 545
68 Iden Meri K Deet 1931 29 825
69 Ohr Inner K I Tolke, U S Toorac Surp

1015 7 50

Occite vis A W nd Harry R.C. Yak I

Biol, 1910. 3 30 Prin, 1 All Chir 1910, 47 361 72 Pr montr K. W. Arch Surg. 015, 60 213-73. Riters n. c., H. I ternat Zbi Tuberk, foreck

1070, 14 6). Row N. H nd River r C. Lancet, Lond pit

1 33 75. RON I W and Statones, T II Lancet, Land

935. 1 102

76 Rerrie T. Wien, klm, Wehr 914, 77 30 77 Resse, J. G. J. Thorac Sorg 944, 77 316, 78 Surra, L. Zacht Taberk, 93, 86, 27, 79. Surrangen, I. Ike Chirurgie der Bentorpie.

Berli Julius Speinerr 1020, Vol. 1

to. Idem (buoted by \men, surg Gyn. Olst., 1915. Schuster 7sch T berk 0 5 3 200. Schwitz W O Beltr K5 Tuberk, 1936 83 650

32

33. Idem. Rev tuber: Ent, Juli Series, 1937
84. Sen senés, J. Zecht Tubert, 1937
84. Sen senés, J. Zecht Tubert, 1937
85. Sen sents Presse and 1973, 37, 334
86. Station III Brit. J. Tuberc 1935, 37, 384
87. Sen C. Acta, in seand, 1935, 76
88. Idem. Theoretische Grundlasses, Chir. 93

937 9.8

85 Idem: Incorrection Granutavia, G., 186, 186m. Techn. Erg. Chi. 037, 0 31. 19. S0 Invex C. H. Pubanz, R. H. RESTREEL, J. S. Chin, M. J. Neurobianz, 044. 67. 0 5m. ns. M. O. Colorado M. 10 qu. 16. 77. 02. Sevilini, A. F. H. Serg. Gran. Old. 190. 69. 78. 03. Sevilini v. C. R. Mail, R. J. H. va, H. B. Larsot.

Idem. Chirurgie du poumon. Rappart au International d'Chirurgie. Morcow 1807 Idem. List actuel de la chirurgie intrathoracique

Paris Maron et Cle 1914 98. Idem. Arch med hir app. resp Par 1936. Locurre medico-chirarpeak

99 TUFFIER and MARTI Paris M won & Cir. 9 o. O. Wonler J I and WALKER L. E. Internat. Aber

Sarg 1943, 8 Zowing O. Beit Kiln, T berk., 913, \$4 124

## THE RH FACTOR-SEROLOGIC BACKGROUND AND CLINICAL APPLICATION

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HEN a foreign material such as, for example a disease-producing microorganism enters the human body the latter is likely to respond with the formation of substances which destroy the in vader These substances, known as antibodies, usually function by agglutinating or by dissolving the foreign material. Antibodies may be absolutely specific in that they will attack only one particular antigen or toxin or micro-organism. Certain antibodies may be present in the body from birth so that the first invasion by the antigenic material is met by the already available defense force. This type of body reaction repre sents the process of immunization or if the antibodies are fully developed a state of immunity

The antigen-antibody reaction which apparently is an attempt by nature to protect the body against noxious influences does not always proceed without damage to that body. If the total bulk of the affected foreign material or micro-organisms is sufficiently large, the agglutinating process within the bloodstream is apt to produce so much dead material in the form of coarse particles that capillaries may become obstructed and kniney function be impaired or if the dead material is broken down too rapidly a complicated systemic reaction to these 'denatured" substances may set in manifested by chills, fever flushing chest and back pains, etc. If the foreign substance happens to be erythrocytes introduced with a transfusion of whole blood or of red cell resuspensions, there may be jaun dice reflecting rapid destruction of the foreign red cells.

The so called A and B substances found either separately or together in the red blood cells of most human beings are in a sense antigens and they determine the four blood groups (A, B AB, and O the last named being the group whose red cells contain neither of these two substances)1 They are also called agglutinogens, because the

cells containing them are agglutinated (although they may be and frequently are hemolyzed Le dissolved) when brought into contact with ag glutinins (antibodies) which are specific for the A or B substances and which are normally present in the serum of a part of the human race. Nor mally if an individual s red blood cells contain an agglutinogen his serum does not contain the corresponding agglutinin as there would then obviously occur destruction of the red cells within their own serum. That is to say anti A applu tinin is absent in individuals whose red blood cells contain A agglutinogen The normally con stant presence however of anti A agglutinin in the serum of a person with B cells renders that person's blood incompatible with that of an m dividual containing A (or AB) cells

It is common knowledge that a transfusion reaction of severe type is practically inevitable if blood from a different group is introduced into the blood stream of any individual except one whose serum contains no agglutinus capable of destroying the injected red cells as it is this destruction of the foreign cells which almost invariably is the cause of the reaction. This is the reason we call an individual a 'universal donor' ('blood group O') if his red cells contain no A or B agglutinogens so that the latter cannot be destroyed by pre-existing anti A or anti-B ar glutinins in the serum of individuals receiving such a donor's blood it is furthermore the reason we call an individual a universal recipient ('blood group AB') if his serum contains no anti A or anti B agglutinins, so that it cannot agglutinate or otherwise damage foreign red cells containing either A B or A and B agglutinogens.

In pregnancy a mother may carry a fetus whose blood group will differ from hers because of inheritance from the father as father and mother do not, of course always represent the same group. One might therefore expect that the mother's already present anti A or anti B (or both) agglutinins would create havoc with the fetal red cells and red cell producing tissues, if the fetus has the corresponding agglutinogens within its cells, as such agglutinins readily pass through the walls of the placental villi which separate maternal and fetal blood. This actually does

From the Pathologic Laboratories, St. Mary Horpital, Dt. Boaton, director Toe A group incindes subgroups (A, A, A, A) whose existence occasionally is responsible for uncropulated "hitz algoot" incompatibility. These details do not contribute to this discussion and are therefore not considered further here.

occur, but only very rarely and the result may then be damage to the fetus in the form of "ery throhlastosis foetalis, which may take the form —depending in part on the seventy of the dam age, in part on the organ or thane chiefly affected in the infant, such as bone marrow or liver—of "hydrops foetalis," with death of the baby prior to or soon after delivery or of profound and progressive anemia, or of "feterus neonatorum or possibly of a combination of these pathologic changes. (For purposes of didactic clarification only the familiar blood groups are invoked in this introductory discussion. More specific data follow)

Almost all individuals are 'secretors, that is to say, they possess the A or B substances not only in their red blood cells, but also—and actually in much greater concentration -in other tissue cells, and continue, moreover to produce these substances in large amounts, so that they are even excreted in saliva and gastric juice (these fluids are the chief source of some commercially prepared A and B substances) When small amounts of anti-A or anti-B agglutinins are introduced into the bodies of 'secretors' gradually and by a route other than direct introduction into the circulatory system, they are readily neutralized or fixed by the abundant A or B agglutinogens within the body tissues before agglutination of the red blood cells, with their much weaker A or B concentrations, can occur This is the reason why group incompatibilities of the A and B type between mother and fetus almost never occur. That is to say the red blood cells of secretors are sur rounded, so to speak, by a defense wall which is breached, or rather droumvented only by the therapeutic device of intravenous administration of foreign blood in large quantity

That trouble due to incompatibility of this type cours at all is due to the fact that run individuals are inco-secretors, that is to say they appear to possess A or B agglutinogens only in their red blood cells, which are thus exposed to the action of any anti A or anti-B substance which may either through the placents in the case of a fetus, or by transfusions in child or adult, get into the blooditream. In other words, there is no available A or B substance elsewhere in the body to neutralize the anti-A or anti-B authodies before they reach the red cells. In the fetus the effect may be erythroblasticals, in the recipient of

a transfusion it may be a transfusion reaction.
The 'Rh factor' is an antigen which for all
practical purposes may be considered to be entirely similar to the A and B substances, and, like
these, it is also found within the red blood cells.

The two points of prime importance in casidering the clinical problems related to this rel blood cell factor are (i) that it crists only in the red blood cells that is to say all individuals on non sectors? in regard to the Rh factor (i) that there does not exist normally any anti-Rh satisfact or agglithms in human screen.

The implications as to the first point are that any Rh-positive individual (i.e. one whee red blood cells centain the Rh factor) is behicked exposed to the destruction of his red cells if these are brought into contact with an anti-Rh aguitain as his other tissues contain no Rh sustance to neutralize such a specific aggiutain and thus to protect his red cells.

The implications as to the second point are that even though all Rh-positive individuals are nonsecretors, they are ordinarily in no danger at all as no normal individual has anti-Rh agglutinins in his blood. Consequently blood from Rh positive and "Rh-negative (Rhnegative meaning simply absence of the Rh factor in the red blood cells by corollary group 0 blood might be termed AB-negative viduals can safely be given to Rh-positive or Rh negative individuals interchangeably with no risk whatever provided, of course, that donor and recipient are compatible as to their A and B groups In other words, there is no need to consider Rh compatibility as far as sumediate danger is concerned, in contrast to the situation as regards the A and B blood groups, and this fact explains also why ordinarily only the usual typing and cross matching procedures (for A and B substances) need be done to avoid transfusion reactions.

The Rh factor is dominant and follows the Mendelian laws of inheritance, that is to say in a mating of a genetically fully Rh-positive with an Rh-negative individual, the progeny will invariably be Rh positive The Rh-positive proreny however may carry a "hidden or recensive Rh-negative gene, and if such an individual is mated with an Rh negative individual, some of the progeny will be Rh-negative. An individual whose blood is Rh-positive and who carnes only Rh-positive genes is "homozygot." An individual whose blood is Rh negative and who carries both Rh positive and Rh-negative genes is hetero-If the blood of one partner in a mating therefore, is Rh-positive and that of the other is Rh-negative the blood of the progeny will be either Rh positive in all children if the positive parent is homozygot, or m one half of all possible children if that parent is heterosygot.

In pregnancy there may be, and probably frequently is, some intermingling of maternal and

fetal blood through leaks in a traumatized pla centa. In the case of an Rh negative woman carrying an Rh positive fetus such intermingling is at first quite unimportant in contrast to the situation of A or B incompatibility with a non secretor fetus because the mother normally has no anti-Rh agglutinin with which to damage the fetal red blood cells. For this reason the first child in such matings is almost invariably normal, even if blood intermingling takes place in such an instance

The introduction of Rh-positive red cells into Rh-negative blood will however initiate the production of anti-Rh antibodies so that prolonged or repeated contact of such blood with Rh positive red cells will eventually produce incompatibility The latter will take the form of destruction of the Rh positive cells with resultant transfusion reaction on the part of the antibody-producing Rh-negative recipient of such cells, or damage to the fetus (e.g. erythroblastosis) in the case of antibodies formed by the Rh-negative mother entering the circulation of her Rh positive fetus, which as a non-secretor' in respect to its Rh factor cannot protect its red cells from the mother's antibodies by neutralizing the latter

In other words, once sensitization of an Rh negative individual has occurred the status of that particular individual in regard to the Rh factor is the same as his or her status in regard to the A and B substances.

The mitial lack of anti-Rh antibodies explains the fact that the first child in Rh-positive-Rh negative matings is normal and that transfusion reactions due to Rh incompatibility develop only gradually with only mild manufestations at first after repeated transfusions of Rh-positive blood into Rh negative individuals, and usually after a lapse of time necessary for the development of the anti-Rh antibodies. Of the white population about 87 per cent are Rh positive (negroes 92 to 95 per cent, Chinese and Japanese, 99 per cent) Actually the proportion of erythroblastic infants born of that population is considerably less than would be expected statistically because (x) there must (on the basis of existing knowledge) be direct contact between maternal and fetal blood to initiate development of anti-Rh antibodies, presupposing placental leaks, (2) individuals differ in their ability to develop sufficiently large concentrations ( titers") of antibodies to cause damage (3) the relatively small number of women in our present population having more than one or two children naturally diminishes the likelihood of erythrobiastosis.

On the other hand, the increased use of blood transfusions in present-day medical practice has increased the risk of sensitizing Rh-negative individuals by giving them Rh positive blood so that it occasionally happens that an Rh-negative woman will produce erythroblastosis in her first born because she received Rh positive transfu sions previously, thus enabling her to develop anti Rh antibodies in preparation so to speak for her Rh positive child. Conversely if the husband of an Rh-negative woman is heteroxygot the first 2 or 3 children may be Rh-nega tive so that the first Rh positive child, even though it represents the third or fourth preg nancy is just as safe as if it were the first born as there will have been no preceding antibody stimulation Theoretically at least an Rh negative woman who as a child received intra muscular injections of Rh positive blood could concervably be sensitized, but the likelihood of serious consequences of the form herein discussed is certainly remote

An apparently complicating feature in the Rh picture is the more recently well established existence of several Rh types which may appear separately or in several combinations. This deserves mention in this connection only because the general medical literature occasionally refers to these subtypes by name, and because even if only in rare instances, it is possible for an Rh-positive woman to have an crythroblastic Rh positive infant on the basis of an Rh incompatibility. This would be because the father and mother happen to represent different Rh types, with the infant inheriting from the father an Rh factor absent in the mother's blood.

An additional complicating feature is the discovery of still another blood factor (more cor rectly red blood cell factor) which has been called the Hr factor in this country and is apparently identical with the St factor of British investigators. It is present (as determined to date) in the red blood cells of all Rh negative individuals as well as in those of individuals possessing certain of the Rh factors, that is to say about 75 per cent of the white population is Hr-positive (this includes the 13 per cent Rh negative portion as well as all Rhe Rhe and Rh types') The corresponding Hr antibody can contribute cases of incompatibility between Rh positive or Rh-negative letus and Rh positive mother Thus, it is necessary to know of this Hr factor and its antibody to avoid ignoring the possibility of incompatibilities when ordinary Rh

These last three are, of course, "Rh-positive ; see appended blife-egraphy for terminology

and anti-Rh testing seems to indicate freedom from danger

To the ranks of Rh-positive—Rh-negative in compatibilities must therefore be added those occurring among Rh subtypes the Hr positive—Hr-negative combinations antibody action on nonaecretors in the regular Landstener groups, and so far not mentioned those relating to the M N and P factors, the latter three long known in paternity testing but otherwise hardly of

significance clinically

The A and B nonsecretors, however chiefly of theoretical interest, were discussed earlier in this report only to furnish a more readily comprehensible groundwork for the discussion of the Rh and related problems. From the point of view of frequency incompatibilities induced by preg nancy or multiple transfusions remain chiefly an Rh positive—Rh-negative problem. Actually over on her cent of all cases of infant envithroblastosis occur with Rh-negative mothers, with the remaining less than 10 per cent of cases distributed among all the other aforementioned incompatibilities, and within this lastnamed minor group the Hr factor is probably responsible for the majority of cases.

Laboratory procedures for determining the Rh factors and their antibodies are similar to those long in use in determining 'standard blood groups, but are more difficult to perform and thus are subject to misinterpretation A frequent error in many typing laboratories is the reporting of an Rh-positive individual as Rh negative, as many improperly controlled sources of such reports still use commercially advertised typing serum of animal origin which has the triple faults of (1) not reacting to all Rh types, (2) re acting poorly in most or many instances in which it should produce readable reactions and thus causing false negative readings, and (3) of producing false positive reactions in Rh negative infants. Aside from the last named occurrence no anti Rh typing serum should, theoretically ever give a false positive reading in a properly conducted test.

Many surptisingly weak reactions is time obtained from blood of women hearing markedly erythroblastic infants, and many fatse negative reactions in tests for anti-Rh antibodies have been explained by the concept of so called 'blocking antibodies', meaning substances in the serum to be tested which attach themselves to Rh-posture red cells (or more correctly to the Rh factor in those red cells) without causing agglutination thus preventing ordinary agglutanting antibodies from

producing a visible reaction. It is now becoming apparent that such blocking antibodies run parallel and may be identical with the anti-Riantibodies which destroy Rh-positive red cells as viro and that this test tube phenomenon may reflect artificial differences between reactions occur ring within the bloodstream and those observed in the laboratory This should also serve to emiss at least in part why the customary cross-matching" procedures for the regular blood groups were done these many years without discovery of the Rh factor and its antibody Such differences are further indicated by the fact that the test tube reaction upon which we rely almost entirely in determining the Rh status is agglutination, whereas the reaction within the human body appears to be almost entirely one of bemolysis or at least of a combination of these two processes. Another potential source of confusion is the fact that Rh antibodies appear to react best at body temperature, Le they are "warm agglutinhs, in contrast to anti-A and anti-B antibodies, which Recently developed cold agglutinina. modifications of testing methods have larger) overcome these handscaps, and Rh typing is now an adequately sensitive and dependable test with the right reagents and in trained hands.1

A so called 'biologic test' has been described and recommended, consisting of the introduction of a small amount of Rh-positive blood (e.g. oc.,) into the circulation of an Rh-negative helividual with testing of the latter's serum for evidence of subsequent hemolysis as an index of the presence of antibodies, but this procedure is considered by the writer to be reprehensible and at this time unjustified as it obviously tend to attinulate antibody production where there was none before. It is well established that minute amounts of Rh-positive red blood cells (sorth as are assumed, for example, to escape mto maternal blood through damaged placental villi) may suffice to situalists such a reaction

The only good sources of spontaneously or curring dependable anti-Rh typing serum at present available are women who have recarly given birth to crythroblastic infants, and, mak more rarely Rh negative individuals who have reacted to multiple Rh-positive iransfusors. Such women should therefore, if health, be urged to contribute blood while their anticoly titer is high and can be paid for such deattless at the usual rates, as the Blood Grouping Laton-

The appended bibliography It is essential, in this writer's episode that any inheratory or bised bank worker was propose sub-III (year that any inheratory or bised bank worker was propose sub-III (year the paper seeking with those return mentionations, or he interest proposed to a topical supresentation, even the greenest actions in

tones in Boston (Dr Diamond) will on receipt of such blood credit the sender with typing serum

in proportionate amounts

New sources of high titer typing substance in probably ample amount are now available obtained by fractionating serum from Rh-negative individuals with artificially stimulated anti Rh autibody production. This procedure is the same as, or similar in principle to that previously in effect for the production of high titer anti-A and anti B substances.

Rh-negative donors should of course be available through hospital lists for transfusions. It goes without saying that their standard blood groups must be established as well. Such lists cannot, however include women who have given birth to erythroblastic infants as their blood is apt to contain some anti Rh antibodies at all times.

In view of the comparative scarcity of de pendable anti-Rh typing serum to date as well as of the faurly well established scope of the Rh problem in medical practice, it is at present neither desirable nor necessary to type every patient routinely for this factor. It is however proper that typing for the Rh factor be done prior to transfusions, in any female patient before and within the child-bearing age, in all pregnant women, in any postmenopausal woman with a history of having borne erythroblastic infants, and in any individual, male or female, who is to receive multiple transfusions over an extended period.

If a hospital patient is found to be Rh-negative, and if there is a history of previous unexplained transfusion reactions or of erythroblastic progeny the blood should automatically be examined also for anti-Rh antibodies. If a patient is Rh positive but if there is clinical ground for suspicion of blood incompatibility—as for example in a pregnant woman with a history of ahnormal deliveriest—her blood as well as that of the husband may be sent to Dr Phillip Levine or to Dr Damond for Rh subtyping and Hr typing at least until such time as hospitals generally may have available the necessary testing materials for determining Rh subtypes, Hr bodies, etc. in their own behaviories.

If anti Rh antibodies are found in a pregnant woman the physician should be notified and may then consider prophylactic procedures such as premature induction of labor or cesarian section

The term abnormal deliveries should not include here monatrosities, such as a searcephalon, as both embryaingically and on the least of charact experience & lincompatible necessor be increasted for resident abstraction. This applies also to the relatively frequent mincurringes cuty in pregnancy In addition preparations should be made in advance of delivery for immediate checking of the infant s blood and clinical status with consideration of immediate transfusions of Rh negative blood, not from the mother. With such a treatment plan an anatomically normal-appearing infant, even if jaundiced at birth should recover completely. The chief risk is central nervous system damage from prolonged kernklerus ie jaundice of the cerebral basal nucles but such risk is slight if jaundice is not permitted to be come prolound or to persist over a long period.

If a woman whose Rh status has not been previously determined is delivered of an infant which is laundiced or edematous or unusually pale, and if the physician wishes to prove or rule out erythroblastosis due to a blood incompati bility without delay and with the fewest labora tory procedures, he should order a blood smear study on the baby ( differential count ) if this reveals erythroblastosis preparations for transfusions of nonmaternal Rh negative blood should automatically begin, with simultaneous determination of the baby's Rh and the mother's anti Rh status the latter tests to be done at that time chiefly to avoid the unlikely but possible accident of giving Rh negative and thus Hr-positive blood to an Rh negative baby carrying maternal anti-Hr antibodies. When possible the placenta should be saved in all such cases for pathologic study

There has been some published controversy as to the merits of giving erythroblastic infants Rh positive blood, on the assumption that the anti Rh antibodies transmitted by the mother to the infant might be more rapidly neutralized by the additional Rh-positive red cells. Even if this be granted (disregarding the clinical impression that such antibodies within the infant frequently are not free for complete neutralization at any one time, but are somehow 'bound' and are released only gradually to act on the infant a red cells) it should be kept in mind that the neu traizing of such antibodies is taking place within the living infant, not in a test tube and that it represents a wholesale destruction of red cells within the body without substitution of non affected red cells, so that an additional burden is placed on an already damaged liver as well as indirectly upon other tissues in the form, at least in part, of anemic anoxia. It would therefore seem more sound physiologically merely to re place the infant's own destroyed Rh-positive cells with indestructible Rh negative cells until the remaining maternal antibodies have diminished to the point of harmlessness, which will mevitably

# SURGERY GYNFCOLOGY AND OBSTETRICS

be the case within a few weeks postpartum and the cut was recome a sen need proquarium and the state of the later than the later the unnuty occurs tong octore that. Unviously the older the behy the safer the influsion of Rh. Positive for term was be assuming there as some for translations to combat a linguing Accorde (doe to delayed to course a missing to the baby? sincular (one to unapper sectors) or one one of the anti Rh antibodies are no longer in evidence.

age in evaluate. Lacking Rh-negative donors, the mother's Rh negative red cells may be infined into the infant against the scan may be moved more the mann and an amount of the scan may be seen and a seen moved to the scan mann and a seen movement of the scan manner of the sca autr uny maye teen separated them town section and are resuspended in educe as the material and an estimated in some as the internal and an estimated in the solution of course in the solution of the solut STEP and can be eliminated by such separation The father's blood is obviously not suited, as it is infant.

for a week a business as vory your amount of a series and the factor inherited from the father which are in the first place responsible for the damage to the Attention is called to the possibility of in

Attention is caused to the pressure of in-Greater uniter of remainings comments of extra during prematurely induced in the control of the they Whether this represents an actual hazard in practice remains to be seen but it must be considered in weighing the relative ments of labor induction versus centrean section. The practicing physician a greatest problem is

Age practically purposed a granted production of adrice to Rh incompatible parents. He that or strike to so movement for second and order to so movement for seconds and evaluate all Pertners muss, mes assemble and evaluate an perinear available of the most and laboratory evidence in the most evidence in Outa, her puts control and another of various of the mother a "antibody potential as Aveilable, of the mother a surrowy potential as reflected in antibody bler and averity of damage terestate in actional steer and severity of comage to previous offspring and the possibility that the humband man has been severed to be a formal to previous outcomes and the passionary runs on the bulled in the best of the passionary runs of the latter in formation can exactly be obtained in such cases torization ten oncessy be obtained in auto cases, as it will be remembered that there appears to be

as a way or temperature of the and contract of the a treatmer reasonable present treatment of the factor and the absence of any or presence at suctor and the source of any or presence of only certain Rh factors in the blood, which makes out) to the An action of the bounds, which is the possible to attempt the boundary determination of de possible to a recuipe as possible of the combined me of the combine heteropeot inaviouss by the common use of the said Hr and specific anti-Rh seen. Rh typing of the said specific anti-Rh seen. Rh typing of the said specific anti-Rh seen. and it and special and radius and it prints of a partial and singlings of of previous and it. the meanura percent and anomals or or previous children if there are several, may permit do COUNTRY IN GENERAL RESERVATION OF THE CONTROL OF TH termination of believely for maximum or inchesion without recourse to Dr. Diamond a

namenta without recourse to Dr Diamond a satura of the satural of example one Rhangsaire and the satural of the assurancy, as, for example one con-negative child is Advice to parents may include warming against

Acrose to parents may include warning against becoming Promont immediately following de livery of an erythroblastic infant (on Permit Myery of an environmentation trusted for pleasure and the mother to subside an environmental for the mother and and the second support to support and support and support supp

antibody checking and possibly psychology SECURITY CHECKING WITH PARTIES PROTECTION OF PERMISER preparation to constant action or premare mindered of labor. It is furthermore executed that the mother refusin from survives to service. that the mother stream from norming an explanation child, as her milk will combin the and Duratur cutting as not time was contain the same bodies responsible for the infant a drong. On the bottes responsive to the master across concerning of the hand, if the handard is beternypot or the Other facility is the massach to receive and or an analysis of the last and a second a second and a second and a second and a second and a second an Numer a minimary parental appears to or my the Possibility of entirely normal children should be the control of the possibility of cultures and make a second by the physician and shoeld be the keys in manuse by sine pays an an area account to the parents in advance, so that the capuagues to the parterns in advance, so that the school of the school o Miles will not use connectic in the second physician because of apparent discrepance is

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# **EDITORIALS**

# SURGERY Gynecology and Obstetrics

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JUNE, 1946

# "INFLAMED AND INJURED TISSUES NEED REST

being placed upon the ambulatory treatment of fractures of the lower extremity and upon early rising after abdom inal operations after operations for hernia and after childbirth it may be worth while to recall some of the principles of Hunter of Hilton and of Hugh Owen Thomas and their insist ence upon the importance of rest in wound healing

The names of John Hunter and his older brother William are familiar to every medical student that of Hilton probably much less 50 John Hilton (1807–1878) began the study of medicine at Guys Hospital when only 17 received his diploma at the age of 21 and then entered the dissecting room as demonstrator of anatomy For 17 years he worked in the dissecting room and postmortem room before he was appointed at the age of 38 assistant surgeon to the hospital and lecturer on anato-

my In 1863 after the completion of a series of lectures before the Royal College of Sur geons he published these lectures in a small volume Rest and Pain¹ which exerted a profound influence both on his contemporaries and on succeeding generations of surgeons on no one more than on his admirer Hugh Owen Thomas His essential philosophy he expressed very clearly at the close of his four teenth lecture

By regarding this subject of physiological and mechanical Rest in what I concrive to be its proper professional light, the surgeon will be compelled to admit that he has no power to repair directly any in July I will induce him to acknowledge, in all hu mility that it is the prerogative of Neture alone to repair the waste of any structure. He will the reshire that his chief duty consists in ascertaining and removing those impediments which obstruct the ardernoving those impediments which obstruct the reparative process, or thwart the efforts of Nature, and thus enable her to restore the parts to their normal condition.

To secure the rest which he considered of fundamental importance in wound healing (as of course did John Hunter and many others before him) he constantly drew upon the extensive anatomical knowledge acquired during his long years of apprenticeship in the dissecting room. His emphasis upon the importance of pain as an indication both to diagnosis and to treatment, and his method of providing rest for inflamed tissue are pointedly brought out in his discussion on inflamed joints in Chapter VII

I may remind you that when a joint becomes in flamed it is painful and difficult of movement it becomes involuntarily fixed by Natures own process, thus securing comparative rest to the interior of the joint. Indeed we may lay it down as an axiom that Nature instinctively renders an inflamed joint comparatively fixed and flexed.

Rost and Pain. Course of Lectures on the Influence of Mechanical and Physiological Sec. in the Treatment of Accidents to Changle and Disposals Value of Pain. By and Sorgical Disposals, pain S. F.R.C.S. edited by W. H. C. be lat John Hiller, M. C. F.R.C.S. edited by W. H. C. Jacobson, M.A., M. Ch. (Ozne.) F.R.C.S. London; G. Bell and Son, Ltd., 1920.

He goes on to describe the innervation of joint and surrounding muscles that permits and brings about the rigid muscle contractions that immobilize and protect the affected joint. The obvious corollary is the careful splinting that provides a substitute and relief for the contracted muscles and permits the painful spasm to subside and still insure the needed of test.

The same principle of relief of painful and spastic muscle contraction resulting from in flammation of surrounding tissue is exempled field by many types of cases—fractured bone suppurating joints ostcomyelitis nerve in juries rectal and anal ulceration, etc. etc. A somewhat board application of the principle of rest that carries its own connectations is his of a patient with a chest injury (Lecture 1).

A physician, residing not very far from me had under his care a patient who had received a blow npon his chest by a fall upon the part and as he was, upon ma corest oy a sant open to pass.

atter several days, still suffering a good deal of pain in breathing the physician saked me to see him in reference to the possibility of fractured ribs. I could fand no fracture but I observed that the patient had ment to tractime but a observed that the partent and a most wortying wife. She was increasintly talking a mas worsyms with one was uncountry causes to him day and night, and there were continual contentions between them upon domestic affairs. I sag sessed to the physician that the sole cause of the Sexicu to the physician that the patient spain was, in all probability produced by the patient constantly moving the influed of brused soft parts by using his cheek and large in speaking. All I ree oy using no coest and using in speaking. In a recommended was that he should hold his tongue, and orannemen was that it amount may be suggested that his wife nave and come continuation. I requested that the would not say a world to him, but would provide him with a date and pencil so that he might write down all his desires. From that time he got quickly well

One believes that Weir Mitchell would have approved of this treatment.

Perhaps better known to the surgeon of today than Hilton is his follower and admirer that doughty little man with peaked cap and ever present eigerette to whom every worker in the field of bone and joint surgery is sogreatly indebted High Owen Thomas (1834-Thomas went still further than Hilton in his insistence on enforced uninterrupted and prolonged rest.

His message to the surgeons of his time was the they did not understand the meaning of the and rest. Hilton he said fixed a limb in a spint, and believed he had given it rest. Immobilisation be beld to be the first requisite but it must be appeal in to be the man required that it man or symmetric such a way that the diseased part was not compress. ed, nor the normal C culation of the lumb is arr ear interfered with All forms of plaster-spint accessrily exert an injurious pressure and for that research and several others he abandoned them at an early stage of his practice. Pressure he held, was a form of restlessness or irritation. If he applied a staff or clastic bandage to a diseased knee joint, so as to compress and surround it, he held that in so far as he lessened the movement of the joint be a seited repair but in so far as he compressed it he himdered repar Rest had to be continued without intermytee until all trace of unsoundness had disappeared loss the joint and then that point being reached the cure would be completed by the gradual return of natural voluntary movements.

Kenth in his delightful chapter on "The Principles and Practice of H. O Thomas in Menders of the Manned sees on to cite his application of the principle of rest in a condition with which we rarely connect the name o Thomas—obstruction of the horsel

"The treatment of the case I have selected for an example has been placed on record by his nepter Sir Robert Jones.

"I remember well how Mr Thomas called the reference tives together and told them he was going to make a fight for the patient a life. He used them to be loyal and to help him and to add to his personio. he threatened them with a coroner's inquest if they gate the patient anything without express permusion Above all things the patient was to have no mile that cardled and loaded the bowels with solids. Then the loot of the bed was to be elevated to lemen the pressure in the abdomen a morphia injection are given and nothing but ups of water with a fittle arrowroot. For the first few days he vasted the pr tient five or six times a day. Almost immediately the vomiting was reduced to about once in twenty-loss hours the patient became casy and stept, but the abdomen was tense. Twice he performed parameters an (for the relief of pressure) being careful sor to allow the trocar to remain in the intestine longer than a few minutes, for fear of a fistule. On the tramp fourth day at intervals, a very little fates was passed on the twenty-sixth large quantities, and

Manage of the Malmod, the Australia and Psychological Points of Edition in March 1982, April 1982, Apr

later in the day a few small scybalae. Again during the night a copous pultaceous motion and this again followed for three days by prodigious quantities of this facest fluid

From the method in which that case was treated we see that rest was to be applied with the meticu lous care and rigidity of a Calvinistic doctrine Rest was to be secured first by sedatives-to place the howel at ease and relieve nain the bowel was to be restrained from all manner of work by absolute star vation he declared he had never seen starvation cause death in a case of intestinal obstruction how ever prolonged. The bowel was not to be disturbed by any act whatsoever such as the giving of enemata or rectum ticking as he most unprofessionally phrased the practice. Nature, he said 'is late in working a relief and patience is needed. His critics said his treatment of intestinal obstruction was not new and modern surgeons will declare it to be bad. His medical critica, however were wrong opium and starvation had been often prescribed and employed in such cases rest had been enjoined but Thomas was the first to apply rigidly and completely the principle of rest as a logical system to such condi tions, and to carry it out in the form of enforced uninterrupted, and prolonged rest.

Many illustrations of the emphasis on rest in modern therapy can be quickly called to mind. The treatment of tuberculosis by rest of the body and rest of the involved lung is the very basis of modern therapy Wangensteen Miller and Abbott introduced an effective method of combatting intestinal obstruction that exemplifies the principles Thomas stressed so clearly. Orr applied the teachings of Hilton and Thomas to the care of ostcomvell tis and gave a new meaning to the words en forced uninterrupted and prolonged rest.' More recently Dragstedt has applied the prin ciple to the treatment of inflamed and ulcer ated gastric and duodenal mucosa by remov ing the irritating influence of excessive gastric secretion through division of the vagi

Accurate and painstaking as were the exper imental observations of Hunter the studies of Hunter and Huton in dissecting room and post mortem room and the clinical observations of all three men neither Hunter nor Hilton nor Thomas had the opportunity of following the process of wound healing by microscopic studies of tissue from experimentally produced

wounds It is of interest then to note that in reports of such studies by many workers (Harvey Howes Mason and Allen, and others) the lag period of wound healing is con stantly emphasized and the fact that during this initial period of from 4 to 6 days the strength of the wound depends solely upon the suture material used. Mason and Allen¹ have shown that in the case of sutured tendons the tendon ends become swollen soft, almost gel atmous and that tension applied during this early period can result only in cutting through of suture material and separation of tendon ends. Howes and Harvey¹ have stated

From this study one is able to say that fibroplasia starts abruptly at the fourth day and proceeds with decreasing velocity until a maximal strength for this phase of healing is reached around the twellth to the fourteenth day and that by the sixth approximately one third and by the eighth approximately two thirds of this strength is obtained. This of course, is readily checked against and correlates with surgical experience. This phase of fibroplasia has been studied in wounds of all tissues in which the normal tensile strength is greater than the maximum of the fibroplasia car ledentical in type.

The fact that at a later period during the process of healing physiologic tension and activity provide a helpful stimulus to sound healing of soft tissues of tendon and of bone was well recognized by Hunter, by Hilton and Thomas and again has been confirmed by many well controlled experimental studies. Until time has elapsed for fibroplasia to be gin-and its beginning will be influenced as Howes has stated 'by careful surmeal tech nic with the minimizing of infection and con tamination in the wound and with the inser tion of small amounts of suture material 'the 'injured and inflamed tissues need rest. It is obviously not the answer to every problem It is a principle of wide application and far reaching importance SUMNER L. KOCH

Mann, M. L. and Allen, H & The rate of healing of tradens. Ann. Sarr. 641, 13 Ang-430 "Hower, E. L. and Harvey, B. C. The choical significance of experimental studies in wound healing. Ann. Sarr. 135, 62 641-646.

# THE SURGEON'S LIBRARY

# REVIEWS OF NEW BOOKS

E are happy to welcome the Journal of the History of Medicine and Allied Sciences' to the company of surgical and medical four nels. The motive for this journal and its purpose are so dearly set forth by Editor George Rosens introductory pages that we repeat a few sentences

"History is one of the most powerful driving forces in human development. Every situation that man has faced and every problem that he has had to solve have been the product of historical developments and processes.

10 uniconstant on own sweets to be capable of playing an intelligent role in sharing to be especied or pasying an intensigent rose in snaping our own civilization, we must have knowledge of the actions of the bast.

During the bast seventy nice actions of the medical profession pass. During the past seventy five years a mage part of the history of medicine.

sincerely believe that this trend has resulted in a serious loss for a profession which by implication still ecknowledges the importance of the historical approach each time it writes or speaks of the case approach come for this trend may be attributed to medical historians who were not always able to make modical history the living dy namic thing that we believe it to be. We do not want to cultivate medical history as a mere search for antiquities, as a kind of hunt for curios, but rather as a vital integral part of medicine.

No one would have agreed more whole heartedly with Dr Rosen than Otler Welch, Cushing and Cutter-men to whom the memories and achieve-Cutter-men to whom the neumans and while ments of the great doctors of the past were living and ments of the great of our heritage and our present day atte faments.

A partial list of the table of contents of the first number will give the reader a cine as to the scope of names was a second cause a cost as or the super of the new fournal. Some Galenic and animal sources the new youther come of Benjamin Water of Vessilus the London years of Benjamin Water house a note on William Blake and John Hunter pharmacopocias as witnesses of world history the postulated dentistry woodcuts. Bernardino Mon take de Monnerrate author of the first anatomy in Spanish medical education in 17th century England.

The editors of SURGERY GYRECOLOGY AND OR-After curious or Journal wishes to the new Journal and high hopes for its success

HE Manual of Surficial Anatomy by Tom Jones and Willard Shepard was prepared under the anapters of the Committee on Surgery of the

JOSEPHA OF THE HERRORY OF MERCENE AND ALLESS SERVEL. NOW THE LAND AND ALLESS SERVEL NEW AND ALLESS SERVEL NEW

Division of Medical Sciences of the National Research Council. It is one of a series developed to funds the medical departments of the United States Army and Navy with compact prescrition of necessary information in the field of military ar

The objectives are plainly set forth in the for word. According to Major General Kirk, in the tar gery of traums great demands are made upon the surgeon a knowledge of anatomy, in the treatment of traumatic injuries under the extrem condition of was a concise atlas of applied anatomy is required to permit "a rapid visual review of any part of the body and the proper surgical approaches to the

In a second foreword Vice Admiral McIntin commends the artists for the preparation of The drawings which for accuracy and simplicity may be considered unsurpassed. These comments and commendation record the chief characteristics and the successful nature of the Manual, they merely require elaboration.

The figures are arranged in the following order and with the indicated coverage in pages lead and neck (33 pages) thorax abdomen, and pelvis (40) apper extremity (49) lower extremity (50) The section on Illustrations is followed by a 55 page explanatory index, which is essentially a goosty It not merely lists the structures pictured but defines many of them and augments the attendant legends. Many of the figures are executed in sach a way that surgically important deep structures are projected (unally in color) in relation to super hcial, palpable, landmarks. For example, in purely anatomical pictures, cerebral ventrices, dari venous sinuses and tributary reins are shown is interrelationship and in their relationship to cerebrate Syri and to bones of the skull accessory at since and allyary glands in relationship to region of the face palmar synovial aboaths, to skeleton and to surface markings vessels and nerver, to bone of the extremities. In anatomicosurgical illustrations, which are the control of which are grouped in acts for the major divisions of the body the same very serviceable scheme is employed on even more ambitious scale. In the plate depicting performations, for example, the series begins with transverse section showing the austonical oute of approach to the heart this is followed by one recording skin and muscle inculous in reitne to the costal cartilages another to expose costal corrilage another to capacitation of the corrilage and heart with coronary vessels. Thoracotory translations and heart with coronary vessels. aymnathectomy laparotomy lambar sympathetic block arthrotomies for all major knints supraches

to all long bones commonly involved in fractures are illustrated with equal lingenuity. Ingenuity a hand maden economy is here an able supporter Surface landmarks, topographical succession in transected part, and structures scribilly encountered in the incisonal route are almost invariably shown in a angle plate of multiple figures with execully selected labelling of crucial elements and in a pattern of arrangement reflecting the best in artistic taste and the highest in pedagogic value

All drawings were done with the line technique. They are uniform, strikingly clear and invariably

crucel.

It is earnestly to be hoped that when the needs of the Army and Navy have been met, the book will be made available for regular commercial sale to medical schools. The undersigned would encourage his own students to purchase this excellent manual

DANNEY AVEN

THE two volumes entitled Clinical Cystoscopy by Lowram E. McCres can be recommended without reservation to everyone interested in urology The make-up of the books is exceptionally well done. The type is large and easy to read, the paper is of unusually good quality with a glossy surface that reproduces very well the photomicrospaphs, drawings, diagrams, pictures and actual color photographs. There are 66y illustrations of which 106 are in color

The first volume concerns the cystoscope its history and use in diagnostic procedures of the biadder and use in diagnostic procedures of the biadder and use in the seventeen chapters can be found reference to nearly everything that is known in modern urology The section on cystoscopic photography is proof of the author's creative genins in perfecting a camera that will take color pictures intravesically. The actual color photographs of the biadder mucosa both normal and deseated, are accurate and hie-like. Nothing like them can be found in any similar publication. This contribution to the specialty us the result of many years of patient labor and is definitely worth the effort.

The second volume as divided unto fifteen chapters, eleven of them are devoted to the kidney. Renai anomalies, function tests, injunes, infections, calcub, cytis and tumon are treated in an interesting and able manner. Chapter XXII discusses medical discusses of the kidney as subject not usually covered in a unological test. The last three chapters deal with unology in women and children and unological rontgenography. At the end of each volume is an excellent bibliography covering the subjects discussed in the respective chapters.

The author has been faithful in his intention to present a concise yet complete compendium of every disease observed or diagnosed by the cystoscope. He has presented his material in such a manner as to

CLIMICAL CHEOGODY: A TREATME OF CHEOGODY TRUNKS, DIAGNOST, PROCESURES, AND TREATMENT By Lawrida E. McCres, M.D. F.A.C.3. Philadelphia: F. A. Davis Co. 845-

make one feel that urology is an important field of medical endeavor. The accuracy of modern methods of diagnosis and treatment is clearly emphasized We feel that Dr. McCrea has made an important contribution to modern urological literature.

Ensuren Chowcev

THE interesting monograph entitled History of Surgical Aneithetia' by Thomas Keys has an introductory essay by Chauncy D Leake and a concluding chapter on the future of anesthesia by Nocl A. Gillespie. The excellent introductory comment of Chauncy Leake reviews his personal contacts with anesthesia. He stresses the lack of fundamental knowledge regarding the basic concepts of pain, and marvels at the accomplishments in the relief of pain regardless of the gaps in our knowledge still unbracked.

Thomas E Keys was reference librarian for the May Oclinic and, as a major with the medical corps was assigned to the Cleveland branch of the Army Medical Library These unusual contacts together with the author's keen historical perception have made possible this exciting human story of the

development of surgical anesthesia.

The work includes a revision of the five essays which were published in Anesthesiology revision of chronology and a selected list of references arranged.

by author and subject.

The author has made it his responsibility to correct many of the errors which have crept into the history of anesthesis and to try to present with an unbiased judgment, based on historiography the medical student an interesting picture of the drama on progress in anesthesis during the past roo years It will provide the anesthesist with a resumé and bibliography and the discerning anesthesiologist with an up-to-date compilation of many historical facts of anesthesis and related subjects. It can be highly recommended as a concise volume of factual information regarding the history of surgical anesthesis.

THE second edition of Nitrous Oxide-Oxygen Amerikasio' by Clement is enlarged by the addition of so pages and 22 engravings

The more important additions or changes in the second edition concern the nitrous-oxide theory of anesthesia, the technique of administration of nitrous-oxide oxygen the practical and applied physical oxyge of anesthesia, the mechanism and treatment of shock, the dangers of prolonged oxygen deficiency and details as to the use of the nasopharyngeal air way in dental practice. The discussion of shock as it concerns the anesthests has been markedly improved in this new edition. The section on physiology has been enlarged and improved through

THE HENORY OF SOURCEL A TERRELL. By Thomas E. Keys. New Jerk Scheman's, 245.

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Philosophia. Lee & Pringer 1845.

inclusion of recent advances in research. Considers. ble space has been devoted to a discussion of airways and particularly t endotracheal technique in anesthesia. As in the first edition there is an excellent review of the signs and symptoms which de velop under nitrous-oxide anesthesia and a helpful chapter devoted to the algusticance of cyanosis.

Full consideration has been given to preoperative medication and this subject is now set spart in a special section. Basic instructions for the administration of nitrous oxide-oxygen are not markedly

changed from those of the first edition.

The author emphasizes by repetition the need for preoperative medication for supervision of anesthesis by a well trained and experienced anesthetist for active co-operation of surreon with anesthetist and for an alert anesthetist who can recognise promptly the symptoms of impending shock and institute proper therapy MARY KARP

IT is always delightful, after an absence of months, to greet old and admired friends and when they appear in a jaunty new outfit and still sparkling with enthusiasm and helpful ideas our admiration is redoubled The new sixth edition of Homens Text book of Surgery! brings also an unwelcome reminder of the inexorable passage of time the distinguished author is now Clinical Professor of Surgery Emeritus nine of the twenty two original contributors have passed into the Great Beyond-all in the fifteen short years since the appearance of the first edition.

It is hardly necessary to point out again what a felicity of style and expression, what delightful glimpses of historical background and what a rich sense of humor Homans has added to a comprehensive grasp of surgical principles and technique to make this volume an outstanding contribution to the literature of surgery He has made the task of the surgical student a pleasant one and has broadened

his outlook in every direction.

It is always difficult in reading a new edition of so comprehensive a treatise to gauge accurately the changes and revisions that have been made. As Homans says in his preface 'the value of chemohas been affirmed the advanture of complete immobilization of wounded limbs has been supported and transfusion of abole has been found superior to the use of even the best of the blood substitutes. These statements indicate a few of the lines along which changes and additions have been made. Fortunately sufficient time has passed since the introduction of the railous mides and penicillin to give the author an opportanity to make considered statements concerning their indications and use (the sulfonamides) tend to starilize the blood stream but they do not be the bacterie in the initial lesion which still require surgical drainage' (p 73) the local use of such agents in abdominal wounds will probably be entirely abandoned (Allen) Intravenous ed-

ministration of the sulfonamides results in a rapid high concentration of these drugs in the peritoned Foreign body reactions occur in the abdominal cavity after local use of the less soluble members of the group" (p. 918) Penicillia is referred to frequently particularly in connection with spreading infection of cellular tissue, septic son throat, esteomyelitis, infections of the brain and meninges, of the ear and eye, of the pleural cavity

and of the genitourinary tract.

Blood vessel suture blast, the immersion sysdrome, the treatment of burns, the surgery of the sympathetic and parasympathetic system (unusually comprehensive) external fixation of fractured bones. the technique of skin grafting-are only a few of many subjects which have been enlarged upon or

included for the first time.

The bibliographical index-a distinctive feature of Homans Textbook-again directs the reader quickly and accurately to sources where he may find more detailed discussion and information of specific subjects. All in all the interested reader cannot fail to realise how well the whole field of sur gery has been covered and what a distinctive contribution Homans has made to surgical literature. Smerce L. Loca

A TEXTROOR OF STREAM P John Homes, M D 6th of Spring field, HI Charles C Thomas, 1900 and 190

# CLINICAL CONGRESS OF AMERICAN COLLEGE OF SURGEONS

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Committee on Arrangements HOWARD PATTERSON Chairman FRANK GLENN Secretary

## OUTLINE OF PROGRAM FOR CLINICAL CONGRESS AP-PROVED BY BOARD OF REGENTS OF AMERICAN COLLEGE OF SURGEONS

T a meeting in Hot Springs Virginia, on April 1 the Board of Regents of the American College of Surgeons approved A a preliminary program for the Clinical Congress, to be held at the Waldorf Astoria in New York City from September o to 13 in ac cordance with the following outline

## Menday September o

10:00 General Assembly for Surgeons and Hospital Representatives, Grand Ballroom 1 30-3 200 Panel Discussion, Empire Room

200 Clinics, Demonstrations and Clinical Group Confer

ences, Selected local hospitals.

200 Hospital Conference, Sert Room.

200 Surgical Film Exhibition (General) Grand Ballroom.

3200-5'30 Assembly of Initiates and reception, Grand Ballroom.

320-520 Panel Discussion, Empire Room

8:00 Presidential Meeting and Convocation, Grand Ball-

## Tuesday September 10

9200 Clinics, Demonstrations and Clinical Group Confer enone, Selected local hospitals.

1020 Hospital Conference, Sert Room

9 30 Surgical Film Exhibition (E.E.N.T.) Jensen Suite

930 to 1230 Forum on Fundamental Surgical Problems, Grand Ballroom

1000 Surgical Film Exhibition (General) Empire Room. 11:00 Group Clinical Conferences

Ophthalmology

Otorhinolaryngology 1,30 to 3200 Panel Ducumien, Grand Ballroom 2200 Clinics, Demonstrations and Clinical Group Confer

ences, Selected local hospitals. 2000 Hospital Conference, Sert Room.

100 Symposium on Fractures and Other Traumax. 2700 Symposium on Fractures and Other Traumax. 2700 Semples Film Exhibition (General) Empire Room. 2700 Paulo Discussion, Grand Baltroom. 2700 Semples Film Exhibition (E.E.N.T.) Empire Room. 2700 Hospital Conference—Trustees, Fest Room.

8500 Scientific Session, General Surgery Grand Ball

8xxx Scientific Seasion, Panel Discussion, Ophthalmology Jensen Sulte.

8:00 Scientific Session, Otorhinolaryngology Le Perro-

onet Soite.

## Wednesday September 11

9200 Clinica, Demonstrations and Clinical Group Confer ences, Selected local hospitals.

9 30 Hospital Conference, Sert Room. 930 Surgical Film Exhibition (E.E.N.T.) Empire room. o to 1200 Forum on Fundamental Surgical Problems.

Grand Ballroom 10:00 Sungleal Film Exhibition (General)

11:00 Group Clinical Conferences Ophthalmology

Officiantoogy
Otorhinolaryngology
11200 Meeting of Governors of College, Jensen Suite.
1120 to 300 Panel Discussion, Grand Ballroom.
1200 Clinica, Demonstrations and Clinical Group Confer

zno Symposium on Cancer Empire Room. zno Symposium on Cancer Empire Room. zno Surgical Film Exhibition (General)

2 30 Hospital Conference, Sert Room. 7:00 Surgical Film Exhibition (E.E.N T.) Empire Room.

7 30 Hospital Conference, Sert Room. 8200 Scientific Cession, General Surgery Grand Ballroom 8200 Scientific Session, Joint E.E.N T Empire Room.

### Thursday Settember 12

0:00 Clinics, Demonstrations and Clinical Group Confer.

ences, Selected local hospitals.

9 30 Hospital Conference, Sert Room.

9 30 Surgical Film Exhibition (E.E.N.T.) Empire Room

9 30 to 1220 Forum on Fundamental Surgical Problems, Grand Ballroom

10:00 Surgical Film Exhibition (General) Empire Room 11:00 Group Clinical Conferences Ophthalmology

Otorhinolaryngology
1 30 Adjourned Meeting, Governors, Grand Ballroom,
1 45 Annual Meeting, Fellows, Grand Ballroom,

755

\$200 Clinics, Demonstrations and Clinical Group Confer ences, Selected local hospitals.

200 Hospital Conference, Sert Room 3 no Panel Discussion-Graduate Training in Surgery

Jensen Suite. t to to two Panel Discussion, Grand Ballroom. 5-90 Surgical Film Exhibition (General), Empire Room.

3 30 National and Regional Fracture Committees. Le

Perroquet Suite.

7:00 Surgical Film Exhibition (E.E.N.T.), Empire Room

8:00 Scientific Semion, General Surgery Grand Ballroom. 8 no Scientific Semion, Ophthalmology Empire Room. 8:00 Scientific Otorhinolaryngology Sert Room.

## Friday Saplember 13

a co Clinica, Demonstrations and Clinical Group Conferences, Selected local hospitals. 9 30 Surgical Film Exhibition (E.E.N.T.) Empire Room.

200 Forum on Fundamental Surgical Problems. Grand Ballroom 10:00 Surgical Film Exhibition (General) Empire Room.

200 Clinics, Demonstrations and Clinical Group Conferences, Selected local hospitals.

Group Clinical Conferences, Obstetrics and Gynecology Sert Room.

200 to 4200 Plastic Surgery 4 U Blu Room Neurological Surgery Assembly Room M N Thoracic Surgery Jensen Sulta.

Urology Le l'erroquet Suite.

Fractures and Other Traumas, Grand Ballroom.

Orthopedic Surgery Carpenter Foyer and Disher

2:00 Surgical Film Exhibition (General), Empire Rose. This outline, as stated previously is preliminary only, and certain important changes are under consideration which, if adopted, will be announced in the next issue. Next month it will also be not

## sible to publish a much more detailed program. COMMITTEE ON ARRANGEMENTS

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## INTERNATIONAL ABSTRACT OF SURGERY

MUTURES 9 June, 1946 VOLUME 82

#### BURNS

CHARLES C. LUND M.D., F.A.C.S. ROSS W GREEN M.D. F. H. LASKET TAYLOR, Ph.D., destruction of all the deep epithelial cells and

N comparison to the great economic npor tance of burns in all parts of the world in times of peace as shown for instance, by the more than 5 000 deaths per year in the United States alone acientific studies concerned with them have always been relatively small in number and relatively poorly supported. The present war with its lavish use of gasoline and oil as motive power and the use of bombing as a weapon has stimulated the Allies to mobilize as bonal resources and many scientists for comprehensive studies of the consequences of fire. This report will be concerned for the most part with the developments in Great Britain the British Dominions, and the United States. Nothing is known to the authors concerning any studies on burns in Germany and Japan or in their satellite or conquered countries during the 5 years since Belgium has been cut off from the Allied World DEFINITIONS

For many years the universal custom in the A Depth of burns United States and Canada and the preponderant custom in Great Britain has been to classify burns according to their depth into three categories as follows first degree simple ery thema second de gree, partial destruction of the skin but without

From the Boarn Anadements of the Stargical Services and the From the Boarn Anadements of the Stargical Services and the Medical Services (Associated Services) and Laboratory and Services (Associated Services) and the Health of the Stargical Services (Associated Services) and the Health of the t

third degree, destruction of the full thickness of the skin. In the French literature prior to the war the Dupuytren dassification was used by was the supply the desinition the definition most authors. In this classification the definition of first degree burns is the same Dupuytren s second and third degree burns correspond to superficial and deeper second degree burns as just classified and Dupuytren's fourth fifth and sixth degree burns correspond to the third degree just defined Converse and Robb-Smith have recently classified the depth of burns in a manner extremely useful to any one who is evaluating the estimated treatment. This classification divides results of treatment. the burns in such a way that the deep second de gree burns and mixed second and third degree burns, both of which types heal slowly under any treatment, are no longer tabulated with the more superficial second degree burns which heal ensity superness second degree value and they use a with almost any form of treatment. They use a name rather than a number to describe a burn name rather unit a number to describe a number of the rather names descriptions, and prognoses are compared in Table 1 with commonly accepted meanings of the degrees of the Dupaytren and American classifications. This excellent classification has been suggested so recently that it has not been used by other authors as yet. However there has been a widespread use by American authors of the subdivision of the second degree burn into superficial and deep second degree burns Admittedly the newly proposed class of mixed burns will contain only a small propor tion of the cases in any series, but these burns are a distinct and important entity. The authors of the present review will use this new classifica tion in order to avoid any confusion that may possibly arise by the use of either older classi-

heation

PARTIE ETTEN TO NOTIVE PRESENTATION OF THE STATE

Depaytres	American	Converse and Rold-Smith						
Degree	Dagree	Name of Burn	Description	Progressia				
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Affined and at the	Milred stad & grd	Mixed because	Small areas of deep dermal alterages with small areas of deep burns	Hanl deviy				
Car Ar	ard .	Deep	Destruction of whole thickness of the skin fato or beyond the lat	Heal with Officialty Product can tractions unless gratual				

At the occurrence of the burn and for several weeks thereafter it is frequently not possible to estimate correctly the depth of the injury. Many small blebs, some broken and some intact, with an external core of plasma, visible pink corium, and minimal anhoutaneous edema indicate a dermal burn. A dry dead white brown or charred anpearance with beginning subcutaneous edema indicates a deep burn. The appearance of other burns is intermediate between those described and these burns cannot be classified until epitheliza tion or granulation have become evident. Dung wall and Patey and Scarff have attempted to solve this difficult problem. The former has observed his cases with ultraviolet light and a filter after intravenous sodium fluorescein injections. and the latter have studied serial microscopic sections of burns and also the naked eve appear ance after the application of Van Gieson's stain. Both these methods are promising but neither has been evaluated, as yet by other workers.

Until Dingwell sor Patry and Scariff's suggestions have been found to be widely applicable burns should not be classified until healing or epithelization is well under way. Most of the reent authors have been cognizant of this, but there are a few recent articles which indicate that the authors think they can estimate the depth of a burn when the burn is first seen. This is shown, for instance, by a statement that a given form of treatment has "prevented the burn becoming a deep burn.

#### B Area of burn

Although the proportionate area of akin burned has long been recognised as useful as a guide to the prognosts of burns, it has now become of even greater importance as a guide to treatment. On the first needs of a patient with a serious burn is adequate plasms therapy. After a close estimate of the area of the burn and of its proportion to the total area of akin has been made, a formula method to the serious cultimate the approximate amount of

plasma needed during the first day of treatment.

Such a formula will be presented later Long prior to its use for this purpose. Weidenfeld and Berkow (16) made studies directed toward simplifying the recording of and comparison of hurth. Both studied by actual measurement the surface areas of the parts and of the whole surface of many individuals of all ages. As a result of this work Berkow's table" is constantly in use in this country and Great Britain for the study of burns, and all recent important studies have used it. Both Weldenfeld and Berkow pointed out that the proportionate area of the parts of an individual vary widely between birth and adult life. Pack and Davis, Seeger and Wallace also pointed out this fact, but the ma jority of important publications that have stressed the use of Berkow's table have mentioned only his table for adults.

While in search of a suitable diagram and standards for the recording of burns in children, Lund and Browder found that Berkow's tables for adults and children, which have been perfectly satisfactory for work up to date, are oversumplified and contain certain errors that should, if possible be avoided in the more exact studies that are now being made in many chiles. The results of their study are seen in Figures 1 and 2, which are reproduced from their article. It should be noticed particularly that the area of the face makes up a relatively large proportion of the total skin area of infants when compared to the findings in adults, and is counterbalanced by the small area of the infant's thighs and legs. Also, the proportion of akm of all other parts is esentially unchanged from one age to another The area determined for the trunk is much smaller than the area assigned to it by Berkow

#### PATHOLOGY

#### A Local.

Burns either injure or kill cells. The cell membranes become abnormally permeable to various substances A very superficial burn will result in the injury of the most superficial cells but no cells will be killed. A deeper burn will result in the death of cells to a certain depth, and underlying these cells there will be injured but

The response to the mildest burn or the response to a more severe burn at the point in viable cells. depth where the burn is minimal is dilatation of the capillaries and the finer arterioles and venules with markedly increased blood flow through all of the three following a brief period of vaso-

In some mild first degree burns this is the only demonstrable result. In slightly more severe burns the capillary walls are injured and leak blood plasma into the ussues. At the same time other cell membranes leak and there is an abnormal exchange of cell constituents into the tissue spaces and of tissue fluid into the injured or dead cells. If the burn is deep enough red cells in the capillaries may be damaged or even rup-

Because of the leakage of plasma from the capillanes, the tissue spaces become distended tured immediately with fluid This fluid if near the surface, forms in blisters under the epidermis at first and after rupture of the blisters continues to pour out for more or less lengthy periods of time. The fluid that represents capillary leakage at deeper levels finds its way slowly into the lymphatic system (83) A result of this is greatly increased lymph flow from the area. Both the lymph and the bluster fluid coming from the burned area have long been known to be amiliar in composition to the plasma prior to the onset of infection (13

Presaman and his associates have recently restudied this problem and have found constant amounts of albumin and variable amounts of globulin in blister fluid Glenn Peterson and Drinker and Cope and Moore (45) have studied the flow pressure and composition of lymph after burns. The amounts of fluid that may be lost through into or under a burn are frequently large, as will be indicated later. It is also ex tremely important to remember that while the burned skin is permeable to plasma it is also permeable in the other direction. Absorption of various substances will be considered in detail

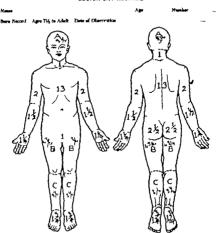
At once, after a burn repair processes start. When the damage is minimal the repair consists of the return of normal tone to the blood vessels the cessation of leakage, and the absorption of any fluid that is present in the tusue spaces. H

cells have been killed the dead cells are removed by lysis and phagocytosis. In case the burn is deep this process takes place only at the border between the living and the dead cells and the dead cells are sloughed off in masses or sheets. The intercellular collagen resists digestion more than the cells and the collagen fibers keep the slough attached until they are finally digested at the point of demarcation between the living and the dead parts of the fibers After the slough has separated repair of the denuded surface takes place by a new growth of epithelial cells from lalands of living cells, from the edges of the wound or by successful skin grafts. If the derma is destroyed and healing occurs by ingrowth from the edge, the repair may be quite imperfect because a very thin sheet of epithelium covers the dense connective tissue that results from the final contraction of the granulation tissue. Besides to being very thin this scar epithelnum is poorly nourshed and poorly attached to its base. The repair process may be delayed as a result of local treatment, of infection or of various deficiencies, such as those of iron protein or vitamins, but cannot be sumulated to heal except by creating optimal conditions so that there is no interference with cell division and cell maturation

Pathology of red blood cells Inevitably when sufficient heat penetrates to a depth in the tissue where there are capillaries, some red blood cells are injured. In vitro studies have shown that thermal injury of these cells occurs between 52 degrees and 65 degrees C. (167) Lysus frees the hemoglobin which is in the

The occurrence of hemoglobinemia and hemoglobinura after severe burns has long been known guomma and avery serious burn. In general, the former is seen only in deep burns of to per cent or more of the body area and the latter in such burns of 30 per cent area or more Hemoglobinemia when it occurs, is found to be most severe immediately after the burn and to decrease gradually during the first 24 to 72 hours. A long duration of hemoglobinemia in the plasma does not occur following burns. Hemoglobin does not appear in recognizable quantity in the urine unless it is present in large amounts in the plasma Its duration in the urine depends on its duration in the plasma. The hemoglobin in the plasma and the urine has been shown to be for the most part oxyhemoglobin mixed with traces of methemoglobin (167) There is no evidence that burns ever release any form of myohemoglobin such as is found after crush injuries."

#### BOSTON CITY HOSPITAL



#### RELATIVE PERCENTAGES OF AREAS AFFECTED BY CHOWTH

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#### S BURN BY AREAS

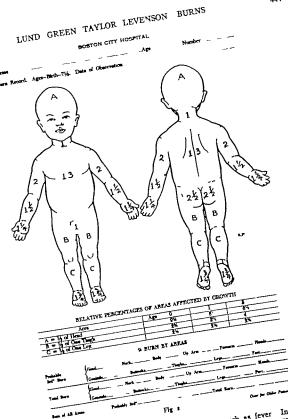
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5mm of 17 1 mm	***					~~ ~

I IE One for Young Children

Shen Ham, and Fleming have confirmed the work of Spiegler and others who found that the blood of the burned patient with hemoglobinemas contained many abnormal red cells, such as fragmostic cells and aphenocytes with an in creased camotic fragility. No hemolysis or agglutuma are found (48). Hemoglobinemia and bemoglobinemia are discussed with the kidney.

#### C Blood plateless

In very severe burns thrombocytopenis severe degree occurs. MacDonald and her sociates have ahown that the platelet count decrease to less than 95,000 within 76 burns murry and the level may remain lew days. This confirms older work of Sairiolf is to confirm that of Welf and Locke



Leucocytosis appearing immediately after the D II hate blood cells injury and continuing for variable lengths of time has long been known as a constant finding in nearly every burn of moderate or severe extent. The early leucocytosis is usually directly propor floral to the severity of the burn Later the leucocytosis varies directly with other evidences

of infection such as fever In a few cases of severe burns a leucopenia or relative leucopenia has been observed between the first and the sixth days. During the early leucocytosis or leucopenia the differential white blood count may show an increased proportion of nonfilamented leucocytes and other degenerative changes in the leucocytes, and the presence of myelocytes and the abscence of cosmonfuls. Van Duyn has recently expressed the courion that these degenerative changes are the result of a torre infers to these cells and that this proves that there is toxemia associated with hums that cannot be accounted for by injury, hemoconcentration or infection. In his oninion this toxemb is caused by some substance absorbed from the humed area

#### F Frank function

Impairment of renal function as evidenced by anuria olemnia, and agotemia is a con nicuous feature in the early course of nationts with severe burns. Albumin hemoclobin and casts are frequently found in the unne of these nationts. while large numbers of white or red blood cells are rare. Reversible azotemia, a sociated with transient objeurs occurs frequently even in lums of only moderate severity. This phenome non is similar to that found following shock of any type and is presumably due to a decreased blood flow through the kidney during shock. The blood flow through the kidney may be decreased to one-twentieth of the normal at a time when the erneral blood flow is reduced only to one-half (111) This is true particularly in hum shock in which the vasoconstriction at any given peripheral I lood pressure seems to be almificantly ereater than in other types of sbock. Van Slyke has shown that a severe reduction in renal blood flow for many bours without reduction in the flow to the rest of the body may be followed by anuria an I death of animals

It has also been suggested that the kidner failure of burns is caused by the hemoglobin that is excreted in some cases (10). This is successful by the histological changes in the kidney which are similar to the changes in nationts with hemoelobinum due to causes other than burns. The principal histolysical changes are the presence of pigmented (bemorlob n) casts, poppirmented epithelul ca a a d accross of the tubules At automy on patients who unvived more than to bours beginning re-creation of the tubular enithelium is also seen (-6)

Although it is well establis of that intra vascular temolysis from a lariety of causes is free ently I Bowel by failure of kainer function the receasi m of this action and the causaine arms of arms in the bemolved Lood re-It that or not been determined. It t i ben i na lokerer tut reither oxifenoga areimt eller at tauthet thagent (10) to an experience of a (10) or por is the samue hand red or smar be the cau after

tata ! ! raux

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is involved, that is that these seems much ann toxic to or only toxic to a killery with an inpaired flow of blood

The problem of the taxicity of hemolyzed bar is intimately linked with the overtion a city alkalmization of the print prevents renal dame-The first urine of nationts with severe lamy is almost invariably strongly acid and immet . . administration of alkali to the nation has less recommended. The purpose of this alla aretion is to present precipitation of the products of the destroyed red cells in the renal tubales is the presence of an acid urine (10). In most rates a hemoelohinemia and hemoelohinuna, when fort observed have already been present for at least an hour before this examination is made or be fore any alkalinization is not ible Conserned the there are no actual data available as to the prophylactic value of this treatment in human te ings and no experiments with animals are known. Although no evidence for or against the raire of alkalinization on entry for this nursose has leen found after careful studies at the Boston City Hospital and the point is still controvenul, we feel that it should still be used. Alkali treatment of burns for other nurnoses is not new but has re cently been brought into great promuter to Resenthal and by For. It will be discussed further under shock.

#### F Pathelogy of the liver

From the time of Bardeen's work there have been reports of liver necrosis in burns. Barkers described a diffuse injury to all the inver er"s Following Wilson and his coworker's report in 1938 there began to be many reports of a di ferent type of infury characterized by fall re cross of the central cells of the lobules a. I by marked polymorphonuclear leurocytic mf traters of the necrotic areas. Wilson queried at that time whether the then popular tannic acid treat ment had some causal relationship to this cha. In 1941 Wells Humphrey and Coll, by dincal and experimental work, definitely a owel that this peculiar necrosis was due to tarel, and poisoning This has been confirmed by others ( t 03) It has also been slown that the me of c application of the tannic acid informers L. amount of its absorption and therefore to or gree of liver injury (93) The forms of treatment that induce slow tanning such as tame, and baths or tannic acul felles a 1 or top 1 are more dangerous than rapid tan and w 5 ta. ) acid and Ever nitrate solut 'rs (te g 155) However as Lee pos 15 out 1 ere 15 liveragens, encountered in tree a ment

acid is used but very few cases have been reported in which bland ontments, saline solution or dry dressings have been used (63, 133, 176) A case of marked central necrosis of the liver has been seen when triple dye was used for the surface

Late liver damage as evidenced by jaundice and decreased prothrombin concentration from 2 treatment (115) to 6 months after injury has been seen in a num ber of patients who have received human plasma or whole blood (114) All of these patients recovered. Clinically these cases are similar to and probably identical with cases of homologous serum seundlee which are due to the transmission of a virus of infectious hepatitis in serum plasma or blood (172)

### G Pathology of the kidney

Scattered pathological studies of the kidney in patients dying of burns have been made (131 184 194) the most recent being a report by Goodpastor et al., who found a close correlation between clinical and laboratory evidence of kid ney dynunction, extent of deep burn seventy of shock, hemoglobinuma, and renal morphologic changes at postmortem. The most consistent anatomical changes were the following on microscopic examination the glomeruli were normal and the tubules showed varying degrees of necrosis affecting principally the ascending and descending portions of the loops of Henke. Pigmented casts in the tubules were a constant finding in these Cases. These casts have been considered to be de rived from the breakdown of red cells, although direct proof of this is lacking Some support to this conception is lent by the demonstration of hemoglobin, oxylemoglobin, and methemoglobin in the blood and urine of all severely burned pa tients. In addition casts composed of desquamated tubular epithelial cells have been found in most of the same cases. Evidence of regenera tion of tubular epithelium was seen in most of the patients in this class who survived more than

In contrast with the marked microscopic abnormalities, the findings of gross emminations 72 bours. were essentially normal In a few cases the kidneys were swollen the cortices pale, and the meduliae dark red, presenting prominent black, brown or purple red streaks converging toward the papillae. These streaks corresponded to the

It is quite apparent from the description that tubules filled with pigment casts. the renal changes are similar to those following hemolytic blood translusion reactions, traumatic shock crush injury and hemolytic sulfonamide

Goodpastor et al believe that the important ethologic factors of injury to the kidney in burns are the presence of marked hemoglobinema hemoglobinuria and severe shock.

## Pathology of the gastrointestinal tract

The occurrence of ulceration of the intestinal tract following burns has been recognized for over 100 years Curling directed special attention to this subject in 1842 Harkins (87) has recently reviewed the reported cases The occurrence of reviewed the reported cases the occurrence of gastrointestural ulceration following burns is more common that coincidence would allow A severe third degree burn often of a sloughing septic type is most apt to result in such an ulcera tion A decreased incidence of this complication may come from a more aseptic handling of burns. The only other therapeutic considerations are the realization of the possibility of these ulcers and institution of the proper medical or surgical treat ment of them as is indicated. Up to the present time, no acute ulcer following burns has been treated surgically

Children and females are more often affected but this may be because they are more frequently burned. The symptoms of such an ulcer may be of rapid onset and include epigastric pain melena and hematemesis. The average length of life in ninety four cases with necropsy collected

from the literature was 15.4 days. The ulcer involved the duodenum alone in seventy-one cases, the stomach alone in sixteen cases, and both organs in five cases was single fifty seven times and multiple thirty four times Hemorrhage was twice as apt to be a Istal factor as perforation and the pancreas was often exposed and the pancreaticoduodenal ar Thirteen reports of gastrointestinal ulceration with recovery are also mentioned by

The etiology of the ulcers has not been deter mined. Various theories involving nervous in fectious toxic, and embolic factors have been Harkins. suggested (87) Necheles and Olsen studied the gastrointestinal secretions following burns, as the salivary pancreatic, and biliary outputs were sauvary pancreauc, and onney outputs were considerably diminished. The gastric secretions however were increased by several hundred per cent with an associated increase in gratric motility These writers believe that these obser vations bring forth 'new light on the problem of

Actual ulceration of the gastrointestinal tract has been seen only once in the Boston City Hos-Curling s ulcer" pital series of 60 recent autopsies Therefore, Levensonetal (rrs) think that it is a rare complica

tion must the present modes of treatment. However, the same observers as well as Mallors and Brackles, have confirmed the older observations of congestion of and diffuse hemorthage from the upper gastromitectical tract in human beings. They made these findings only in those patients with exten the burns and severe shock. In Leverson's series there were 6 instances of these findings tot as mentioned above only a Cutling source Similar changes have been found more frequently in experimental animal. particularly the doe and call (75). These changes were as centuated by preburn and postburn heparinara tion of the animals (74).

#### I Pertus wy tract

Up to 1012 injury of the respiratory tract had occasionally been reported as a complication of burns. At that time injury of the respiratory tract a umed great prominence since the masorts of the victims of a tire at a Boston night club (The Coccanut Crove) in which about 500 people lost their lives, had suffered damage to their respirators tracts. The clinical and a ray a precis of these cases will be discussed later Pathological examination (110) revealed that the respiratory damage was essentially that of a laryngotracheobroachitis. Three patients who were dead on arrival at the hospital were examined at autotos, and all showed an intense but mennecrotizing bemorrhagic tracheitis and bronchitis, and presented heavy voluminous lun- from the cut surfaces of which fluid in large amounts could be expressed. Microscopic examination confirmed the presence of scute pul monary edema and demonstrated in the upper tract-cobronchial tree a sembemorphagic exula tion without significant leucocytic infiltration (110)

In in Invituals who deal after varying periods of time in the brightal, (in 12 days) severe ne crotting tracheolemachiti was found with the fination of a peur odg hiberitic membrane Mary of the reconstoning issuese were occlased by the possiblementane and viscal mu of an august consist around the armonant lamage consist of chiefly of corner yets on one and scattered areas of all exists the emphasemanches the fitter of the saph servers after a surressist of their treesagh servers after a surressist of the treesagh servers after the result of the saph servers.

There is their harrothers lead thomas It is sent that the respective is an alternal part of the forms at lightly is such resulted from the luming to limit to the lightly in the lightly i

inhaled enough to render them unconcorrectained the severest respiratory damage (4 it Similar pathogical findings were reported in the Clerchard Clink fire of 1025 (143). However, special fires lavolving many peops are a necessary to cause this type of levan. Generator at dound 10 cases at autopay or 127 it into the dound 10 cases at autopay or 127 it into different days of 1131, observed many patients who movemed in their serves of 600 specials forms. The only factor in common to all of the pater 1821 only factor in common to all of the pater 1821 that there had I inhaled much smole. A few case resulted from the inhalation of smoke form a fer involving nolly a bed.

#### 1 Idrosali

Neiskotten stated in 1917 that the most preminent and characteristic necropsy finders in pa tients with burns were chances in the a re-ulplands. He described swelling realers and periadrenal edema with hemorrhage in all raws of more than 24 hours duration. Microscopics 7 there was necrosis of the cortical cells. Since then others (17-142-79) have reported similar for in rein some but by no means all, burn su, orner. The most recent report is that of Mallon a f Brickles who found focal necrosis of the alteral gland in a cases in which death occurred in Iron ? to a days after the burn. They mentheed and ting of the cords of the outer portion of the certes with accumulation of serous exudate in the spart produced, pyknotic nuclei acidophilu necresi el the adrenal cells, and infiltration with pomorphonuclear cells.

The finding of depleted cortical lipsob partial lath, cholesterol, following burns has been recently confirmed by Sayers et al. who state that lo burns the a brenal glands are stimulated to rehavious by the a frenotropic borno e of t anterior pituitary lobe. Harkans (50) has stated simulat findings and conclusions.

#### K. Spleen and lymph notes

Barleten described seeking and near sin the 1 mphord nodules of the lymph podes perpend imphord tissue and spaces with the construction of the management of the found that his legrees of known feet at the found that his legrees of known feet with found only in children day a which is the found that his legrees of known feet with found only in children day a which is the found that his legrees of known feet with found only in children day a which is a force than manural known feet in the found of a tingle subject beyond a core to

Baker raises the questions whether the karvor rhems is pre-existent to the burn ie a normal finding in children and whether its absence later is not the abnormal feature. Further studies are required to clarify this point.

#### L. Heart.

Kayashima found that after experimental burns in rabbits, electrocardiograms were abnormal. The waves were low in amplitude, the T wave was flattened out, and the ventricular complex tended to be monophasic. Similar changes were observed by the same author in 12 Naval canalities (from 21 to 37 years of age) with from 11 to 20 per cent body surface burns who recovered. Histologically interstitial myocarditis with perivascular infiltration of leucocytes was observed in the rabbits. Buts and Hartman reported 2 cases in human beings (among 6 autopsies) of microscopic fragmentation of the myocar dal muscle fibers.

#### M Pathology of the central nervous system.

Delirum, stupor coma convulsions, hyper pyrexia, and Chevne-Stokes respiration signs which may indicate central nervous system in jury have been described following extensive burns. There have been very menger reports on the pathological changes of the nervous system. Wilson in reporting on a series of extensive scalds and burns mentioned toxic damage in the brain in occasional cases but did not localize the lesions. Pack quoted Crile as saying that the central nervous system injury was seen only as a result of profound shock. Mallory and Brickley reported cortical ganglion necrosis in 1 of the Cocoanut Grove cases, but the patient had suffered from severe anoxia in addition to external burn. She had evidence of carbon monoxide poisoning shock, and severe respiratory injury the first two causing anoxia from the start and the latter causing it later

Walker and Shenkin have reported on 6 pattents who were observed to due of sudden respiratory arrest. All their patients showed essentially the same signs chinically disorientation and mank or stupor with abrupt faulture of respiration but without obstruction of the airway Five of the patients died about the fourth day but the sixth died on the sixty second day. Post mortem examination showed cerebral edema with evidence of marked increased intracranial pressure including widening of the gyri narrowing of the suict, hermation of the temporal uncus through the incisura of the tentorium and hermation of the cerebrilar ton its fine the foramen

magnum. There were marked changes in the smaller blood vessels consisting of degenerative changes of the endothelial lunng with occasional breaks and perivascular petechal extravastions. The ganglion cells throughout the brain showed toxic degeneration, but the most striking changes were in the cortex and hypothalamus particularly in the latter

According to these authors the pathogenesis of these lesions is not clear. Anoxia or the presence of a circulating toxin (32) as suggested by Christophe must be considered. He showed by cross circulation experiments that changes occurred in the paratuberian centers especially at the para ventricular and supraoptic regions of the anterior thalamus. It should be borne in mind however. that Walker and Shenkin's patients showed generalized edema as well as cerebral edema, and It is possible that the cerebral changes are a secondary effect Many additional studies are needed to clarify these points. Unfortunately the few autonsies that have been done on burned patients have seldom included an examination of the head

#### METABOLIC CHANGES IN BURNS

#### A Electrolyte metabolism

The findings of a decrease in plasma chloride concentration in the first few days following an extensive burn first reported by Davidson in 1926 has since been confirmed by a number of workers (52 180 163 179 70 44, 171). These later studies have also demonstrated a decrease in serim sodium concentration and a decrease in urinary sodium and chloride excretions. Fox and keaton Cope (44) and Hirshield (92), using midioactive sodium have confirmed Underhill's Rudier's and Lowdon's findings that much of the lost sodium chloride went into the burned area.

A shift of some sodium into the injured cells in the burned area with a shift from the injured cells of an equivalent amount of potassium has been demonstrated by Fox and keaton and Tabor and his associates (170) The actual rise in circulating plasma potassium concentration is small and well below the toxic range for normal animals (196) However, Tabor (171) has shown that the shocked animal is considerably, more sensitive to rises in plasma potassium concentration than the normal animal.

#### B Autrogen metabolism

Cuthbertson first noticed in 1930 that patients with fractures excreted abnormally large amounts of nitrogen in the urine for weeks after the injury and that this was associated with a loss of weight

and muscle wasting Lucido n ted a similar process in a burned patient. His observations were amplified on large numbers of nationts in a group at the Boston City Hospital (114) during the last a years. It was found that all severe liums that were neither anunc nor too severely eliguric had a birb output of nitrogen in the unne donne the first a weeks and that in a few cases this output continued for many months. Steady loves of from 25 to 30 grams of nitrogen per day have been observed frequently, and on an occasional day the los mas be as high as ac erams. This early increase in umnary nitrogen excretion has also been reported following any acute trauma poisoning or infection (25 50 00 124) The cause of the exces ne altrogen excre tion has not been finally determined. There may be more than one precipitating factor. Associated with the high urine excretion is an early high contratein attroven level in the blood which is the result not only of a decrease in kidney function (transient or permanent) but also of an increased production of nonprotein nitrogen products (16) Clearing of the increased nonprotein pitrogen accounted for only a small fraction of the total urinary nitrogen in rease. In severely homed na tients there is lestruction of large amounts of tusue followed by autolysis and almoration of its products. There is also the possibility that the protein catabolism i in reased by the absorption of specific substances from the burned areas (110) and from the so-talled toxic deceneration of r rotein" associated with fever and infection (140) Increased gluconcoveres may be responsible for 1 art of the mercaned protein breakdown. Browne postulates an in reased production of S hor mone by the a frenal cortex and simultaneously a decreased production of \" bormone which re sults in an increased protein breakdown as a sten in the I mate n of ele one. In any event it has been recently bown that marked abnormalities of the carla hydrate metala him do occur in severely burrel animal (saran I burnan beings (176) and are are used a th h perglycemus lictacefemus and a lowered cart in du sale combinue power This will be a credit more detail later

Hathered to foot a transame in plasma amore ritropin light nee in pair na ammonia nitropin acid i ramule ungen but no charge in liver ammonia i mgen et i stande nitropin light a i store et pina acid in light nee et pina marin sun light nee et pina marin such stir. It is sere in sock to a light need to be in light need to be in light need to be nitropid lament. It has been partitive lament.

eath increased nitrogen, both in the bac 1 a, urine is due in some cases to the presenced; normal mounts of residual nitrogen," in a tion to an increase of normal rabs ances seeing ureal creating and amino acide, 1 a are found in the normal blood and nine. Safety, tory chemical characterization of the connected has not been made.

At the same time that from 25 to 32 grant of nitrozen are being excreted in the unite and the tional 30 to 40 grams of nitrogen may be but in a the surface of the burn daily (178 as 48) 5 4 important losses of pitropen from the surface are commonly seen only in extensive deep barns be in these the losses may continue over long remoti of time. Early after superficial burns there is a large outpouring of plasmalike fluid through Le skin. This contains a high proportion of pro ru Later during the sloughing and granulators stages of deeper burns there is a steady and cosulerable loss of protein in the form of puruent material from the surface. The amount of bu varies directly with the area involved. There losses continue until healing is compare & h losses from surfaces and wounds have not in the pa t been considered in calculating conventional nitrogen halances, and it must be realized that errors of great magnitude may be introduced by such studies unless this factor is considered.

While the large quantities of nitrogen are 1 or 1 lost in the urine and in the dramage from the wounds of such patients, the protein irtile is likely to be greatly reduced by reason of Pic. anorexia and poor gastrointestinal function. Th negative nitrogen balance occurring under these conditions may have serious effects in a few days in the patient with already depleted body per raand in a few weeks in a patient with excellent protem autrition. This is reflected in the dree ?ment of a progressive hypoproteinemia. Tele v an extremely serious metabolic sign. During the first week following a burn a transitory by oreteinemia may be present it is d e to st'is el water electrolyte and protein from the burst stream into the subcutaneous it see er ert. a ? This early hypopenteinemia is without nutrick all significance On the other hand, a cor bandte in plasma proteins after the first week is a s gret marked tis ne protein deprivation. La fes erre dul's eps are taken early weight lon ede-a, los of strength, and drath from malactn ke exce-Methods to combat this process will be d some

#### C Cartoled are marketime

Hypergl remu Isctacefemia a. Hwerrel caton dioxele combining power are frequency from in human beings and animals following burns (sa. 180, 127) The extent and duration of the changes in these blood constituents are roughly proportional to the severity of the burn Clark and Rossiter working with rats and Greenwald and Ellasberg (70) working with rabbits found decreases in the muscle glycogen following burns, Similar determinations have not been made in human beings. Any increase in lactic acid produc tion due to an increase in the rate of muscle giycogenolysis may result in hyperglycemia through conversion of the lactic acid to glycogen and glucose in the liver. The rate of lactic acid formation following burns is, however apparently greater than the liver can handle, resulting in iactacidemia as well as hyperglycemia. In addition to an increased glycogenolysis, another possible source of the extra blood sugar is glucose de-

nved from protein (24) Many investigators have emphasized the role of the adrenal glands in the production of abnormal ities in the carbohydrate metabolism in burns. Hartman (04) has demonstrated an early in creased adrenalin production Browne and Cope et al (47) found increased 17 ketosterold excretion in the first few days following burns, which was followed by a decrease below normal values Numerous pathological studies, as already men tioned have revealed adrenocortical hypertrophy and marked depletion of lipoids. Adrenalectomy was found by Slocum and Lightbody to prevent the lactacidemia but not the hyperglycemia in burned rabbits, while Clark and Rossiter found that neither the lactacidemia nor the hyper glycemia was abolished. It appears that although the adrenal glands may play an important role in the production of abnormalities in carbohy drate metabolism following burns, the entire picture cannot be explained on this basis and indeed the effect of the adrenal glands may be of

#### a secondary nature D. Vitamins

Increased demands for vitamins in burns have been suspected for some time by analogy with studies showing increased needs for vitamins in other diseases (81) Emphrically vitamin preparations such as cod liver oil have been used locally (121) and only for many years in the treatment of burns. Very few assays of vitamins in the blood urine, or tissues to determine the actual requirements in burns have been made

In 1937 Usbekov studied the content of ascorbic acid in the adrenal glands and in the liver of guinea pigs that were kept on various diets before and after burning He found a progressive

fall in the ascorbic acid level in these organs following burns of from 45 to 50 square centimeters of akin. This decrease occurred in all animals no matter whether their diets were high or low in ascorbic acid. The pigs on partially deficient diets showed indolent healing and 'poor' granulation tissue and lost much weight. The animals on better duets lost less weight and had 'better' granulation.

Lam reported low plasma ascorbic acid con centrations in a few patients with extensive burns. Clark and Rossiter and Harkins (00) reported a decrease in adrenocortical ascorbic acid concentration following burns in rabbits, rats, and guinea pigs, Lund, Taylor Johnson and associ ates have studied plasma ascorbic acid concen trations and urmary excretions of ascorbic acid thiamin, ribofiavin, and n methyl nicotmamide in man in the acute and chronic stages of burns They have found that in patients with severe burns on high protein diets supplemented with two or three times the National Research Council daily allowances of these vitamins recommended for healthy individuals (18) the plasma level of ascorbic acid and the unnary excretions of all four vitamins may decrease to very small quantities. Even with small burns the patient on a nonsupplemented house diet may do the same thing. In patients with consistently low plasma and urine ascorbic acid levels the granulation tissue is absent or edematous akin grafts fail and epitheliza tion is delayed Burned patients with low excre tions of B vitamins may have poor appetites, poor bowel function asthenia and poor morale The extra needs for vitamins commence with the burn and remain until healing is complete. In general the extra amounts needed to prevent depletion parallel the area of unhealed burn. Whether it is desirable to try to maintain fully saturated levels of ascorbic acid in the blood and the excretion of appreciable quantities of all four vitamins in the urine is not known. The mainte nance of such levels will, in very severe cases entall the administration of up to 2.0 grams of ascorbic acid, 50 milligrams of thiamin 50 milli grams of riboflavm and 500 milligrams of niacina mide. Comparable studies on any of the fat soluble vitamins and on all other water soluble vitamins have not been made 1

#### BURN SHOCK

Burn shock may be defined as a condition of low blood plasma volume, low cardiac output, low blood pressure and increased peripheral reface the was written Andreas and associates have reported studied for it desired conveniences. In other and have found as increased as

a tance to blood flow. The four factors that have for a long time been considered important a causes of burn shock are loss of circulating o tema toxic substances in the blood pain, and co 1. The two former are now considered to be of prime importance an I the two latter to be at most of minor contributing influence. Shock following a lum may be expected in cases of normal adult with a burned area of 15 per cent or ereater and in cases of feeble adults or children with a humed area of 8 per cent or ereater. As burn shock a frequently fatal if untreated it is a ut ject of great importance and will be considered in some detail. Until recent effective methods of treatment became available most nationts who hed, died in shock. Now they die later

#### Canter

t Loss of circulating plasma. The most im portant cause of burn, book in most cases is the los of plasma from the circulation into the tis ues of the burned area and through the burned area That such losses are large and that the plasma volume is creatly reduced have been postulated for many years because of the severe degree of concentration of red blood cells that has been observed. The first direct quantitative mea ure ment of the reduction of blood volume in burned animals in shork was made by Johnson and Balock in 1911 They from I that the amount of I look that could be removed from such an animal before death was ery small. The amount they named the beeding oforce. It the same time they mea used on later amounts of fluid in the ti um un fer the furn Harkins (%5 %6) ampli tel there experiment and orielated in more detail the relationship between thereding volume" and t I nume I make a vurste firect method I emon trating the Lood relume changes in a wk was presented by C burn and In in in art a multication of their methal an used in the study of human hum all b turnard and his a secures. Then funds ere my ent nereation between the ret tan titepa ma mantt settresare in in hind and the reason of the hermatantles note her knient with flusher tentemostil Hillowell til cate re investment justes until Le imonifora har lim to impolatel after the injury serve man to the first the intentitud the or authorized and three איר ל מו מודו שו מו ביום כל יוד וריירודי ו deepates to test be the time ( -a Premin a librale ta e recautel ti great m hin mit etametarea 1120 7

Chart No 1 illustrates the course of the houtocrit and hemoglobin charges in a patient at ha dermal burn of the hand, and face only ( of the body area) who at no time decerned of a shock

As may be seen from the chart, tie bin hematocrit and hemoglobin a hour after it in were alrea is markedly elevated which dearstrated that the fluid loss may be very marked a first. During the first day the rationt recencile parenteral flui le His otal intake was al erra. his urine output uso cubic centimeters. At u.e. end of 24 hours his hematocrit at I hemoel. had men still further reaching by per cent a. 135 per cent respectively. During this time there was very little external course of para. but an increase in the amount of subcularies edema of the face and neck was rubble. Dutiet the second day the edema begin to subside a simultaneously the hemoglobin and hematicar levels began to fall. By the fifth day the of "a had disappeared and the bematocrit and becoglobin had returned to normal. During this ! the plasma nonprotein nitrogen concentration in mained normal while the total pro em 2 ! albumin concentrations showed slight falls

Comparing the reduction in bood roller to other possible causes of burn shock Ros : or his recently concluded. It is therefore probable that these enormous losses of planea from the bloodstream will initiate shock. I firm see I this prove but one of a number of initiating the tors it is one of himmense importance and easily which justifies vigorous countering uses.

2 Toxins. The literature e meern factor or factors in hum shock is vol me me! very controversul, although few authors have been positive in their denial of such a perc. contributing factor Christophe by some imp ingenious cross circulation experiments in dep howed that circulating toxics injured the lea an I fed to death This he described a "Ir calearn leath." Certainly some of the cle- a. hannes arrocated with these death in lyate the probability that the logs were le o.k at " time prior to death although he 'es out mal per L'e mention of it Another demer rat " burn shock apparently produced w c) by t a fa tors and una sociated with putera less has been made very revently on rats by I'r grate ar Ilus a sociates. He found that rate wh haver mu J burred at ,5 derrei C for 10 8 m in bud hims dese wed mar of sin over with conversite heat work built d Ar a hock On the other back as where sing to I for a near sever I amal at 17

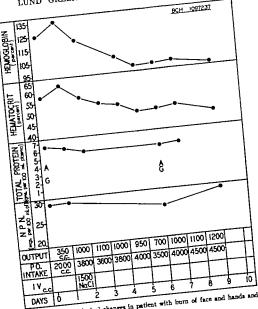


Chart r Hematological changes in patient with burn of face and hands and without shock.

degrees C. for from 2 to 3 minutes died in shock without visible edema and exhibited insufficient local fluid loss to account for death. Similar re sults were obtained when larger areas of the body were severely burned for 10 seconds. These au thors concluded. It is therefore apparent that there are at least two mechanisms capable of producing shock one due to local fluid loss and the other due to some unknown factor

Another important contribution to our knowledge concerning toxins has been made by Perl man, Glenn and Kaufman who described a large amount of a new globulin fraction in the lymph collected directly from the burned area in calves. This globulin may represent a toxin

Rawlinson and Kellaway have found great increases in phosphatase phosphate proteolytic

enzymes esternse, and catalase from heated liver slices as the temperature approached 50 degrees Kellaway and Rawlinson studied tissue in jury by heat in isolated limb preparations. From the perfused hind limbs of guinea pigs and the forelimbs of cats histamine was liberated between 45 degrees and 50 degrees C. In the early hours of perfusion a substance relaxing smooth muscle which inhibited the stimulating effect of histamme was present in the perfusate. No active adenyl compounds could be detected between 37 5 degrees and 50 degrees C. but cardiodepressant activity was found between 42 degrees and 50 degrees C. This was also present in the subcutaneous edema. It was heat stable and was not diminished by incubation with cat muscle or not duminished by incubation with the industry of cat liver extracts. The hydrogen ion concentra

tion of the perfusate showed its greatest increase between 44 degrees and 45 degrees C. The small output of inorganic phosphates between 37 5 de grees to 41 degrees C. was markedly increased at the higher temperatures. Alkaline phosphatase, lipase, and proteolytic enzymes were also set free above 41 degrees C. These authors concluded The demonstration that lipase and proteolytic enzymes were set free from the perfused hind limb of the cat above 41 degrees C. gives color to the possibility that toric products may be formed by ensymatic activity in the tissue spaces. Proteolytic enzymes in lymph from the burned area have also been reported by Zamecnik et al

Rose and Browne have found very high blood histamine levels immediately after the burn. The amount of histamine present decreases rapidly as toxemia develops. These findings are not altered by the administration of sufficient plasma to prevent hemoconcentration. There is a correlation between the degree of injury and the decrease of the histamine content of the blood-Thus, the most marked decrease has been noted from 12 to 16 hours before death. Similar findings have been observed in cases of fatal shock.

Beloff and Peters have found a proteinsse that is liberated from burned skin that they discuss in relation to "burn toxin theones," but they do not

claim that it causes burn shock.

Muus and Hardenbergh have observed that the oxygen consumption of normal rat liver slices is increased when measured in lymph from the burned legs of calves or one dog as mediums. The increase over similar measurements in normal lymph was as great as 41 per cent. When serum was collected after burning a smaller increase was found. In this connection Taylor and his associates (176) have found an increase in the basal metabolic rate in severely burned nationts. The rise was greater than could be accounted for by the fever that was present at the time of the test.

Aub (7) has found that the fluid obtained from within the sheath of a muscle that has been made ischemic by the interruption of its circulation produces shock when injected into normal does. Exotoxins produced by organisms of the bacillus welchi group were found in this fluid. These bacilli were found to be normal inhabitants of normal dog muscle. Under the anserobic conditions of these experiments the number of organ isms and the amount of toxins produced are greatly increased. The toxic effect of this finle is nullified if suitable antitoxin is mixed with the fluid, or injected separately but simultaneously into the dog Animals immunized with toxolds are resistant.

Chalkoff and his associates have found that fluid expressed from the skin and subcutaneous through of burned areas in dogs is toxic to pata. Gram positive anaerobic bacilli and other oursaisms have been identified in this fluid. After Zeltz filtration the fluid is still toxic in most instances. Aub has found that these anaerobic organisms are not normally present in the tissues of man. At present there is no evidence that there toxins are important in the pathogenesis of burn shock in man.

This discussion of burn toxins in relation to burn shock is far from complete and mentions only a few of the important studies that have been made. There seems to be no doubt that many chemicals are released from the area of a burn that all together play a part in the depression of the

circulatory system after a burn. 3 Pain. At the moment of burning and for a few minutes after burns cause sharp pain. Then there follows during the next few hours and, even occasionally for several days, a period of almost complete freedom from pala. At later stages burns may be among the most painful of all ducases. Until recently pain has been considered to be a very important cause of shock following burns. Many experiments have been carried out to evaluate the importance of pain as a factor in various other forms of shock, but in burn shock the only experiments of this kind are those of Kabat and Hedin. Unfortunately their experments on dogs are inconclusive for several reasons, particularly because their burns did not produce shock but merely produced a moderate rise in the bematocrit. Recently the experimental evidence from studies of afferent stimuli as a factor in the production of traumatic shock has indicated a much smaller influence from such stimuli than the many older studies, such as those of Crile, indicated. From an excellent re cent study of traumatic shock in dogs Phemister and Laestar conclude, in part, as follows "No evidence was obtained from these limb traums a flow of nockeptive stimuli experiments that is an important confrom the injured field tributing factor in the initiation of any circula tory impairment or shock which followed."

Evidence derived from the treatment of patients with burns in shock shows that, even in the exceptional instances with severe pain, sedatives have essentially no therapeutic effect on shock comparable to the effects obtained with suitable intravenous finids such as will be described.

4. Cold and beat. Under war conditions and in connection with civilian airplane arcidents some patients with burns suffer from exposure to cold or heat for long periods of time before and after an accident. In peace time civilian life such complications are only seen in disasters of the first magnitude or in the case of individuals living under isolated conditions. Either excessive cold or excessive heat will contribute to the seventy of shock, but quantitative studies of the role played by cold and heat have not been made. Some very important observations on the treat ment of burn shock in a chilled or heated en vironment will be considered in the section on the treatment of shock.

#### B The diagnosis of burn shock

Many writers have described the clinical pic ture of burn shock. As with other forms of shock it is very simple to make the diagnosis in its final stages. One merely has to determine that the pulse and blood pressure are unobtainable. However the earlier periods of impending or mild shock are more difficult to diagnose. Since shock once it is well established is much more difficult to treat than when it is in its earlier stages, it is important to foresee impending shock so that prophylactic measures can be taken.

Careful estimation of the area and of the approximate depth of a burn is important for the anticipation of shock. As already mentioned any patient with a burn area of 15 per cent or greater will probably suffer from shock and any patient with a burn area of 25 per cent will probably suffer from fatal shock unless prompt and active

treatment is given

The pulse and blood pressure should be taken at one-half hour intervals during the first 24 hours. However they are not good indicators of impending shock, since because of the increased penpheral resistance the pulse may remain slow and the blood pressure normal when the blood volume has already been reduced to a critically low level. Suddenly the blood pressure will fall to a dangerous level and even then the pulse may not need.

Direct blood volume determinations are the heat indications of reduced blood volume but they are not practical for clinical work. Hematological determinations are practical and serve accessful guides. Hematocrit hemoglobin and red blood cell determinations are useful Except for research purposes serial determinations at 2 to 3 hour intervals of any one of these is sufficient. The blood examined must be venous rather than capillary blood because of stagnation in the capillaries.

is indicated in Table II apparently normal bematological findings may be seen in the pres-

TABLE II —CALCULATED CHANGES IN BLOOD
AND PLASMA VOLUMES ACCORDING TO
CHANGES OF THE RED DLOOD COUNT PER
CENT OF HEMOGLOBIN AND PER CENT OF
PACKED RED BLOOD CELLS IN PATIENTS
WITH VARYING DEGREES OF ANYWIN DE
FORE INJURY

The state of the s						
	Calculated					
	llemo- globin	Red Calls Mullicos	Red Cell Volume Per erat	Marena Per cent	Volume Fer cent Loss	Plant Column For cont Long
Orlg. itsel Ilgb 100 Per cent	100 10 10	1.	1 14 17	11	15	0 7 89 37
Original Isa) Itab ga Per cant	00 10 30	1 1	40 H 40 H 51 H 67 S	90 L 10 L 4 S 3 S	,,	,;
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Original inal ligh yo rest	20 20	# # # 5 9 5	40 S	63 1 90 1 30 3 42 3	#3 #3 #7	37
Orig mal ligh 60 Per cent	60 \$2 190 10	ş	30 45 5	ij÷	ij	;;

ence of severe loss of plasma in a previously anemic patient. Note in Table II that a slightly clevated hemoglobin of 110 per cent, if found in a patient whose preburn hemoglobin was 70 per cent, indicates that he has already lost 33 per cent of his plasma volume and 37 per cent of his blood volume a loss that would probably cause severe shock.

Serial plasma protein determinations also provide useful information. As plasma is lost from the vascular bed there is a shift of low protein extravascular (chiefly interstitial) fluid into the blood stream. This results in dilution of the plasma protein. If the shift is rapid there is a greater fall in the plasma protein concentration than in the hemoglobin concentration. In some instances the hemoglobin may remain normal and a falling plasma protein may be the chief laboratory indication of inmending shock.

Acturate records of urine output must be kept Lauson et al. have shorn that renal blood flow and urine output may be markedly reduced at a time when the peripheral pulse and blood pressure are normal. If the urine output its good one may feel sure that the general circulation is good if however the output falls one must anticipate early failure of the general circulation.

#### C Secondary effects of burn shock

The effects of severe burns without shock and of severe shock without burns are similar in many instances. For instance, increases in the blood sugar lactic acid, nonprotein nitrogen, amino acids, ammonia, and hydrogen ion concentration and decreases in sodium chloride and ascorbic acid are common to both. When shock occurs in burns it results in an intensification of the same changes that had already commenced before the shock had started. Quantitatively the severity of these metabolic changes parallels the severity and duration of the shock. One metabolic change, however has been recently observed in shock of various types, including burn shock, that is never seen in burns, no matter how severe, if shock is prevented by efficient treatment. Tayron and his associates (174) have demonstrated the occur rence of fibrinolysis in both burn and hemor rhagic shock. Fibrinolysis is the spontaneous dissolution in vitro of the clots in blood within 24 hours. This phenomenon disappears promptly with recovery from shock.

Another complication of burn (and other forms of) shock is 'irreversible shock. As a result of the anoxia and cellular injury that results from prolonged circulatory insufficiency a point is reached where complete restoration of the blood volume will no longer result in the return of a sufficiently adequate circulation to maintain life. If the systolic blood pressure remains below 50 mm. for more than 3 or 4 hours the shock is al most surely irreversible, and frequently it may become so in a shorter period of time. Studies have not been made on "Irreversible burn shock, but studies (66) on "irreversible hemotrhagic shock have indicated that failure of liver function is one of the earliest and most important changes that lead to "irreversibility There has been discussion in the past of the role of generalized capillary leakage as a factor in the initiation of Irreversible shock. Some observers have claimed that it was important, and others that it did not occur Fine and Seligman (67) have demonstrated why both sets of observers may have been correct in their observations under the limitations of their particular experiments. They have shown that there is no capillary leakage at a distance from the burn or other trauma, or at any place, when hemorrhagic shock is studied, from the commencement of shock or during the whole time that the blood pressure is very low How ever if the shock period has been long enough. generalised capillary leakage starts as soon as the blood pressure is brought up by restoration of the blood volume This leakage under these condi-

tions may be one of the major factors in determining 'irreversibility' Because of the great diager of 'irreversibility' it is imperative to prevent shock when possible and to treat it promptly and vigorously when it occurs.

#### D The presention and treatment of burn shock.

The first principle of treatment of any form of block is to avoid, in so far as possible, any treat ment of the petient that will increase the shock, and to postpone necessary shocking procedures (such as dressings) until shock has been prevented or treated. The positive measures for the treatment of shock are taken up first. Of these measures, those that restore and maintain the blood volume are of paramount importance and are discussed first. Omission of them can into way be compensated for by any of the adjuvant methods of treatment discussed later.

x Human plasma and serum. In burns, as indicated previously, the fluid that is lost from the vascular bed is similar in composition to blood plasma. Consequently, it is logical to replace the set fluid with plasma, and it has been demon strated that burn shock may be prevented or successfully treated in nearly all cases if searchy by plasma transfussions in adequate amounts.

The amount and rate of plasma administrator depends on many factors. First, it should be borne in mind that the amount of fluid lost is roughly proportional to the area of surface burn. However berns of certain areas, such as the face and genitalia, which are highly vascular and have loose subcutaneous tissue are accompanied by particularly high fluid losses. Second, the rate of fluid loss is maximal in the first few bours after a burn and then gradually decreases so that at the end of from 36 to 48 hours an equilibrium is trached between the amount of fluid lost and the amount returned to the blood stream from the interstitial spaces. Third, both clinical and laboratory data must be considered in determin-

ing the amount of plasma to be given.

Progressive hemocronomutation, falling plasma
protein concentration falling blood pressure, and
a rising pulse are indications of impending shock.
There are many formulas suggested for estimating the plasma dosage based on blood concentration (20, 58). The most formorely used is that of
Harkins (89) (a) give 100 cubic continueters of
plasma for every point that the hematocrit or
credit the normal of 45 per cent, or (b) give 30
cubic centimeters of plasma for every point that
the hematolichin exceeds the normal of 100 per oral.

As pointed out previously, such calculations, based on an assumed normal hematocrit may be

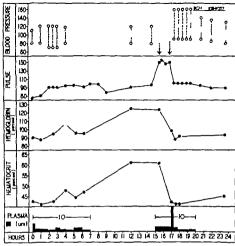


Chart 2. Effect of plasma on burn shock. Blood pressure was not obtainable. (The vertical arrows mean that the blood pressure is not obtainable.)

erroneous if the patient is anemic prior to injury Serial hematocrits should suggest this possibility and calculations should be based on an approximate prebum hematocrit. In addition, such calculations do not indicate the amount of plasma that will be needed to manage the enture course of the burn shock. Consequently frequent hema tological observations must be made during the first 24 to 48 hours. This is well illustrated in Chart 2.

The patient whose course is outlined in Chart 2 was a man of 50 with flame burns of 55 per cent of his body surface, chiefly deep. His blood pressure of his body surface, chiefly deep. His blood pressure normal on entry. Ten units (2 500 c. c.) of plasma were given in the first 7 hours during which time his burns were treated with famile acid and silver ultrate. His hemoglobin pulse and blood pressure remained normal, and plasms infusion was stopped. Five hours later his hematocut and hemoglobin were markedly elevated but his pulse and blood pressure were still normal. During the next 2 hours the patient became chilly nauescated and complained of freeling sick. Sud

denly he became cold, pale and clammy. His pulse was very rapid and threndy and his blood pressure was unobtainable. The administration of 1 roo cubic centimeters of plasma during the next oo minutes restored the hemateorit to normal, but had no effect on the pulse and blood pressure. In the next ro minutes 800 cubic centimeters of plasma were given into the femoral vein by the multiple syringe technique with a return of the pulse and blood pressure to normal.

This Illustrates the necessity of administering plasma rapidly when shock is present. Advantage of rapid infusion in shock is also implied in the recent publication of Kohlstaedt and Page who advised intra-atterial rather than intravenous administration of fluid. However one may construe the efficiency of their intra-atterial administration of plasma to a more rapid administration Caution must be used of course, in infants old people, and those with heart disease. In the nor mal adult with a large burn as much as 2,000 cubic centimeters may be given in a period of an hour without danger of overloading the circulation.

The dosage of plasma on the basis of the extent and location of the burn is also of value, particularly where laboratory facilities are not available. About 100 cubic centimeters of plasms for each per cent of body surface burned should be administered to patients with 10 per cent or more area burn. All of this plasma should not be given according to the following schedule which approximates the rate of fluid loss one-half should be given in the first 4 to 6 hours, one-quarter in the next 6 hours, and the last quarter in the next 12 hours. Smaller amounts may be required in the next 24 hours in zere instances.

Attention should be paid to the clinical appearance of the patient. One of the best guides of adequate therapy of shock is a good urmary out put. If a clinical impression of additional plasma need is at variance with the laboratory findings, the latter should be disregarded. The first 6 hours following a severe burn are critical ones so far as plasma administration is concerned. It is during these first few hours that the physician has the greatest opportunity to prevent shock. No unnecessary delays should be tolerated. When the usual peripheral vems are not available, there should be no hesitation about employing the temoral route or in cutting down on a vein. The use of the femoral route was a lifesaving measure in the treatment of many patients at the Boston City Hospital where at least a thousand of such punctures have been made for withdrawing blood or injecting various solutions intravenously

Another factor influencing the amount of plasma required is débridement. It is common experience that large amounts of fiuld are lost from the body during such procedures as désridement and the cleaning of large burns. The burned kin, although badly damaged and partially permeable to plasma, nevertheless acts as an important dam to the extravasation of flund because of the coagulation of erudates and partial drying of them on the surface. The removal of this barner and consequent opening of tissue spaces is accompanied by an increased fluid loss.

This may be seen by examination of Chart 3. The pattern whose course is described in Chart 3 was a 32 year old woman with fiame burns of 65 per cent of her body surface, chiefly deep who was treated initially with 7 units (1750 c.c.) of plasma given over a period of 12/5 bours. At this time she went into shock despite the absence of significant hemoconcentration. It was known that her bemosplobin pure to injury was about 85 per cent. After a further period of 2 bours, during which time abe continued to be in shock,

infusion of plasma was recommenced and the patent responded with a rise of blood presure to normal. While the infusion was still being administered, debridement was begun. During the course of the operative procedure both the benatocrit and hemoglobin rose abruptly which indicated a considerable increase in the rate of finit loss. Wilson et al. who used cleaning and dibridement routinely prior to tanning, commented on such fluid loss and pointed out the high incidence of shock following this procedure.

Serum may be used in place of plasms with equally good results, as has been demonstrated by its use in large series of cases in Canada and Grat Britain. The reactions which were reported in the early days of serum have not been seen in the later series of cases. Most of the early reaction may have been due to the fact that fresh serum contains thrombin and other substances which are toxic. After a few hours, and certainly after the a weeks during which the serum is now held below me, such substances have dissumered.

before use, such substances have disappeared. a Human albumin. As a result of the work of Cohn and his associates, the United States Navy and the American Red Cross have produced large amounts of human albumin for the treatment of shock. Very little has been available for civilism use to date. A few reports indicate that it has value in the treatment of burn shock (101) At present it is shipped in highly concentrated form (25%) and can, if indicated, be administered without dilution. For emergency treatment of the patient who is not dehydrated it may well prove to have some definite advantages over plasma. It has the advantage that it has a much greater osmotic effect on the circulation than the same amount of protein in the form of pleams. However it has the disadvantage of being a "pure solution that is, it does not contain substances such as prothrombin which are also lost or depleted in shock (174) Zamecnik (198) has shown that in dogs with hemorrhagic shock which are treated with albumin there is a marked fall in the prothrombin concentration, whereas no such fall occurs if whole blood or plasma are used. Janeway and associates have reported a marked full in the plasma globulin in a burn patient who received large quantities of albumin intravenous Additional saline solution and water must be given to patients receiving albumin to replace the interstitial fluid which is drawn into the vascular system by the osmotic action of the albumin.

3 Electrolyte. Saline solution has long been used in the treatment of shock. There is evidence that if it is given intravenously at rapid or moder ate rates of injection the blood pressure of the

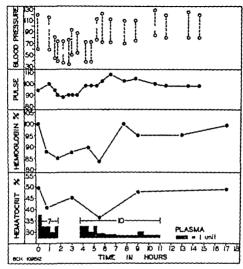


Chart 3 Effect of débridement on rate of fluid loss in a patient with an extensive burn.

shocked individual may be raised but the effect is frequently transient. In addition it appears that plasma protein may be 'washed out" by the saline solution (21) For these reasons saline solution was replaced by plasma or serum in most clinics when these solutions became available, as they dld quite generally in the United States, Great Britain, and Canada between 1940 and 1942 Interest in the use of saline solution alone or in conjunction with other sodium salts has recently again been aroused by the reports of Rosenthal and of Fox. Rosenthal experimenting on mice with standardized burns, has shown that the effects of sodium salts given intraperitoneally or by mouth very soon after the burn are slightly but signifi cantly superior to the effects of serum given intravenously in preventing death of the animals within 48 hours. In his series the effect of the serum appeared to be due not to the contained protein, but to the sodium. He also showed that the therapeutic effect of the sodium sait was due to the sodium radical rather than the acid radical since different sodium salts acted in the same manner Potassium salts increased the mortality Saline solution when given intravenously was not as effective as when given by mouth Isotonic saline solution was more effective than the hypertonic solution Prinzmetal et al have also reported good results in mice with sodium ther any Fox treated a number of severely burned nationts by the oral administration of sodium lactate or sodium bicarbonate and saline solution He gave from 10 to 15 per cent of the body weight of isotonic sodium salts in the first 24 hours. Any vomiting such as occurs frequently in patients with severe burns, was treated by the administra tion of more oral fluid. The results appeared to be good. It must be stressed that in the studies re ported the sodium was used chiefly for prophy laxis and not for treatment of fully developed shock. In addition dangerously low plasma protein levels were seen in some of the petients

This work needs careful consideration. For the moment it would appear that while it is true that there is a deficit of sodium in the burned that there is a deficit of sodium in the burned other substances and, although it undoubtedly is necessary to replace the other substances. It appears to us that sodium salts are necessary adjuncts to us that sodium salts are necessary adjuncts to the treatment of burned back, not the sole there better a possible of the sole there. The work of Moyer et al and Abbott et al on the use of sodium chloride and sodium bicarbonate solutions with whole blood which will be described in the section on whole blood, are of interest in this record.

4. Whole blood Whole blood was used ex tensively to treat burn shock until 1940. Then plasma and serum became generally available in large quantities and almost entirely replaced it. Among other reasons it was widely believed that additional red blood cells could serve no useful purpose when the blood was already concentrated However during the last a years, interest in whole blood has revived, principally because of the work of Moyer at al They studied the therapeutic ef fects of various solutions on the shock of severe, deep burns of dogs. The dogs were shaved and two-thirds of their surface areas were scalded for 30 seconds by water at 85° C. A combination of transfusions of defibrinated blood and gavage of normal saline solution with added sodium bi carbonate solution was the only form of treatment that prevented shock without inducing such complications as cerebral and pulmonary edema in compatible with life The unsuccessful forms of treatment were (1) intravenous administration of saline and bicarbonate solutions, (2) intra venous administration of saline and bicarbonate solutions and dog's serum (3) intravenous ad ministration of dogs scrum with salme and bicarbonate solution by gavage and (4) intra venous administration of defibrinated blood with water given orally ad libitum. Abbott and his associates have found that whole blood transfusions given during the first day of the burn not only aid in preventing shock in human beings, but also alleviate or prevent the subsequent anemia that frequently appears about the third day after plasma has been used. Levenson et al (115) and Evans and Bigger have also treated burn shock successfully with whole blood in a small series of carefully studied patients

5 Glucose The early increased blood sugar in severe burns might be considered to contraundicate the administration of glucose intravenously. However Taylor and associates (176) have demonstrated that there is no impairment of

glucose tolerance or loss of excessive amounts of glucose in the urine under these condition. In addition burns cause depletion of the much glycogen and possibly of the liver glycogen so that efforts should be made to restore glycogen to these tissues by an adequate administration of carbohydrate. Finally as mentioned previously there is an early increase in the nitrogen catabolism and gincose in large amount may alleviate this Glucose should be given in substantial quantities. Harkins et al (or) recommended up to soo grams in the first 24 hours for severe burns. However glucose must be considered to play only a minor role among the many substances given to these patients, and to be almost or entirely without value if it is given in pure solution for either prevention or treatment of shock. 6 Gelatin.

6 Gelatin. Degraded solutions of gelatin have been studied as plasma substitutes in the therapy of burn shock in dogs (147) and the consensus of opinion is that properly prepared gelatin solutions are as effective in the acrot gelatin solutions are as effective in the acrot gelatin solutions are as effective in the acrot class and mortality as plasms. Koop (168) has close to the same conclusion in working with human patients. However plasms possesses a number of properties beyond the osmotic characteristic stated by gelatin and since there are other losses from the blood beyond the loss of comotic properties it would appear that plasms would offer some advantages

7. Gum acacia solution. Although interest in this solution was shown by several investigators up to 1940 in use has completely stopped with the advent of human plasma and serum. And only have these substances been found to be better ter but, sits ocacia has been found to be harmful when given in repeated does (83)

8 Oxygen. The defenses of the body against access of the body against shock and the efforts to maintain blood volume are all in reality attempts to achieve one goal, the maintenance of normal cellular metabolism which is dependent upon adequate oxygenation of the stance. As indicated previously tasue anoris results from the failure of the pempleral circular from the failure of the pempleral circular from the failure of the pempleral circular from the companying shock. Oxygen has been widely used clinically in the treatment of burn shock, but the only clear indication for it is complication of the burn shock by respiratory tract infury.

9 Position. The inducations for raising the foot of the bed or placing the patient in the Trendelenburg position are not as clear in the treatment of shock from thermal burns as in the

restment of simple syncope, since in the burned rationt there is no pooling of blood comparable to that in simple syncope. In the burned patient the find is lost externally or into the subcutaneous tissue, and it cannot be readily returned to the vascular tree by change in position However it appears that the circulation to the brain is improved by tilting the bed even though the blood volume may not be materially altered. It is especially important to raise the foot of the bed during the first few minutes after the onset of shock while other more effective methods of treat ment are being started.

10. External temperature. Because many pa tients in shock are cold it has been customary to cover them with many blankets and also to use bot water bottles or other sources of heat. Blalock has shown that overheating is detrimental to the animal in traumatic shock, and Elman and associ ates (61) have shown that both heating and cooling are harmful to burned animals. As already men tioned, occasional patients have markedly high levers from 18 to 24 hours after a burn. It is important that for patients in shock with a rectal temperature below \$4.0 decrees C. or above 40.0 degrees C. very active measures be taken to warm or cool them promptly but these measures must be stopped as the temperature approaches nor

11 Sedation in shock. As recently as 1942 it was customary to treat burns with very large doses of opinies. Beecher has shown that this is not a safe procedure when shock is present. He points out that morphine is contraindicated in the treatment of fear or hysteria or of any condition in the presence of anoxia. It should be given only to relieve pain. Most importantly he calls attention to the fact that no drug is readily absorbed from the tussies if administered subcutaneously or intramuscularly to a patient in shock. He presents the history of a patient in burn shock who was given repeated doses of morphine subcutaneously without effect. As soon as her circulation was effectively restored by treatment with plasma the whole amount of the drug was taken rapidly into the blood stream and gave the usual effects of an overdose of morphine. Energetic measures were needed to combat these effects. Therefore when opiates are indicated in patients with shock they must be given intra Venously

Another aspect of this problem has been studied by Elman (61) who showed that the mortality of burned dogs was increased when usual doses of morphine or of barbiturates were given. In view of these findings, morphine and other sedatives should be used cautiously in patients with incipient or actual burn shock. Anesthetics have the same harmful effects, and are very dangerous in incipient or actual burn shock. Cyclopropane is safest if one is necessary (21) but Levenson and his associates have found no occasion to use anesthesis at the time of the first dressing in their most recent 500 cases seen during the last 2 years.

12 Pressor drugs. Frank and his associates have recently studied the therapeutic effects of various pressor drugs in irreversible hemor rhagic shock in door. They found no indication of beneficial results from the use of pitressin with or without ergotamine, paredrine commine, or tuamine. Earlier work by Cannon (30) indicated that the capillary blood flow may be actually lowered when such drugs are used. No such studies have been made on burn shock, but by analogy these studies indicate that these drugs would be of no value.

13 Adrenocortical extract. As described in the section on pathology there is evidence of adrenal injury following burns. In addition there is laboratory evidence of increased outputs of adrenalin (150) and of various corticosterolds (24. Rhoads, Wolff and Lee (157) reported promising results from the use of adrenocortical extract in the treatment of burn shock. A more recent report by the same authors reverses this The later clinical observations opinion (158) were corroborated by the experimental studies of Resenthal, who found that in standardized burns in mice there is no protective action produced by either desoxycorticosterone or adrenocortical extract miected subcutaneously when compared with controls injected with saline solution. Lowdon at all had previously reported failure to decrease the mortality of burned animals by the use of desoxycorticosterone. Cope and Moore (45) have demonstrated in dogs that adrenocortical extract has no influence on the abnormal permeability of the capillanes in the burned area. In view of the failures encountered, there is no indication at present for its use in the early post burn period.

14. Vitamins. Govier working on hemorrhagic shock in dogs, has indicated that B complex vitamins, particularly thiamin have a definite therapeutic effect on the shock. In addition to their findings mentioned previously on the effect of burns on vitamins Lund, Johnson Taylor and associates (126) have found great depletion of water soluble vitamins during the shock phase of burns. They believe it is logical to administer large doses of these vitamins early after admission of the patient.

15 Anesthesia and surface treatment. The very serious effects that these items may have on burn shock will be discussed in the subsequent section on surface treatment.

## RESPIRATORY COMPLICATIONS

Injury of the respiratory tract is an important complication of a few thermal burns. It should be suspected in any patient who gives a story of having inhaled large amounts of hot smoke, par ticularly if consciousness has been lost. Patients with injury of the respiratory tract usually have burns of the face, but this condition may be seen in patients with no external burns (68) Singeing of the fibrispae of the pares, soot on the face, and burns of the nasopharynx are commonly seen in these cases. As described in the section on pathology the fundamental lexion is a necrotizing tracheobronchitis. Finland at al found the usual symptoms to be cough, hoarseness, dyspnes, and stridor The sputum was mucoid, purulent, and bloody Occasionally casts of traches and bron chi, resulting from pseudomembrane formation were coughed up. The vital capacity was greatly diminished. Physical examination revealed scat tered areas of dullness, hyper resonance, and rales of all varieties, but chiefly crepitant or fine wheezes. A rays showed scattered small areas of emphysema, atelectasis, and concestion. Sec ondary pneumonia, chiefly due to the staphylococ cus aureus, was seen in some patients.

Any patient in whom injury of the respiratory tract is suspected must be watched very desely A trachestomy kit should be kept at the patient's bedside. Respirations should be charted every half hour Examination of the nose, nasopharynx, epiglottus, lasynx, and vocal cords should be made. If burns of the nasopharynx are present, swabbing the nose with bland oil and having the patient gargle with a warm soothing solution, such as siveose in water will be beloud.

If cough or dyspace develops, the air should be humsliffied. If these symptoms progress in split of humsliffied. If these symptoms progress is split as the progress of humsliffied and poper cent oxygen about lo an oxygen tent. Inhalations of 10 per carbon dioxide and 00 per cent oxygen about lo given for a few munutes every one to two hours to induce deep respirations. The patient should be moved frequently and encouraged to cough. If there is any wheeing or other agras of bronchial spasm, aminophyllin or adrenalin should be given by nebulizer. Generalized lazyugobrocchial spasm may occur very suddenly and may lead to death of the patient unless it is relieved immediately Tracheotomy with artificial respiration may be

necessary Tracheotomy is also indicated if strider air hunger or other signs of larygap obstruction appear. Section through the tracheetomy tube should be done repeatedly as needed. When simple aspiration through the tracheotomy falls, bronchoocopic saviration may succeed.

A dose of 25 000 units of penicillin should be given intramusculity on entry and repeated every 3 hours. If the units output is good, mindiazine may also be given. If the patent is restless, one must first rule out anons, and, if present, steps such as have been described should be taken to provide for oxygenation. For reritesness due to pain, meperidine hydrochlotic should be used rather than morphine or any other respiratory depressant. For restlesness due to nervoussess or anxiety the barbiturates should be used (12).

If the petient with Injury of the respiratory tract has extensive surface burns in addition, plasma should be given without heatstion to prevent or treat shock. Finland found no evidence to indicate that plasma infusions under such curcumstances led to pulmonary edema. Plasma may also very rarely be indicated in the patient with respiratory burns who has no external burns.

## INFECTION IN BURNS

Infection is always a serious complication of extensive deep burns, and frequently or rarely according to the efficacy of treatment, a complication of lesser burns. Its control is, therefore, one of the most important aims of therapy

A. Initial contamination few pathogenic orgaisms since the process of burning sterilizes the skin in the affected area. However unless protected, the lesion is rapidly contaminated. Great sources of serious contamination are the respiratory secretions of individuals handling the patient (33). Also important are the materials which come in contact with the burn and the bacteria that may remain viable in the deep crypts and ducts of the skin in the burned area, of in the skin of adjacent areas.

B Bacteriology In carriul bacteriological studies of burns in patients cared for in a special ward at the Royal Infirmary at Chasgow Clark (33) found that the bemodytic atroptococcus was the predominant infecting organism. This comborated the previous studies of Adriccia in 1933 at the Johns Hopkins and the Boston City Hospitals. However, most of the studies that have been carried on during the last 4 years at many videy separated civilian hospitals in the United States have shown that hemolytic streptococcal infec

tions in burns are infrequent (135 117). They show that burns at all stages are almost always contaminated or infected with several organisms. Aerobic, anerobic, gram positive, and gram nega tive bacteria, and cocci may all be found in any angle culture. The number of varieties of bac terix found is usually related to the care and variety of the culture methods employed. Serial cultures taken from a single burned area show changes from tune to time in the variety and proportions of the different organisms. They also show that the hemolytic staphylococcus is the predominant pathogenic organism. Almost every culture at any stage of the many burns studied by Meleney (135) Lyons, and Levenson (117) have shown it to be present. It has not been eliminated by sulfonamide or penicillin as given to date. Fortunately its mere presence does not prevent successful grafting (117) When the hemolytic streptococcus is predominant, however it does interfere with successful grafting in many cases. Fortunately it may be eliminated by the use of large doses of penicillin (113) or of sulfonamides (3) Acute hemolytic streptococcus infection of the burn with the rash of scarlet fever occurs occasionally in children. It responds well to chemotherapy

Symbiotic infections in which an anaerobic or microacrophilic streptococcus is associated with one or more other organisms occur narely (135) Under these conditions there may be burrowing of the infection at the edge of the wound and destruction of otherwise vuble dermal tissue.

An unexpected finding of Meleney s study was the frequency with which anneroble organisms were observed. However there was essentially no clinical infection with the bacillus welchil or other clostridla except the bacillus tetanl. It must not be forgotten that chincal tetanus is occasionally seen in burns and that tetanus antitoms should be given prophylactically to all patients with deep burns.

The more frequently encountered bacteria are lasted in Table III in approximate order of their importance

The skin in dermal burns retains most of the resistance that normal skin has sgainst infection If rest and avordance of recontamination are provided, any organisms growing on the surface soon die out as healing progresses (42). With deep burns the problem of infection is much more serious because deep burns are always infected from a few hours after the burn until healing is complete. During the first 2 to 6 weeks necrotte alough is present on the surface and it furnishes an excellent medium for bacterial growth. After the slough

TABLE III-VARIETIES OF BACTERIA FOUND COMMONLY IN CULTURES FROM BURNS

Staphylococcus hemolyticus, cosgulase positive Streptococcus hemolyticus, (beta and gamma) Bacilius proteus Bacilius coil Diphtheroids Other staphylococci Other streptococci

Other enterococci
Pneumococci
Bacillos mucosus capsulatus

Bacillus welchil

Bacillus tetani Other clostridia

has separated the open granulating wound con tinues to harbor bacteria as long as the wound is open. The question of control of infection by local and general measures will be considered later.

## HYPERPYREXIA IN BURNS

Patients with burns frequently have a period of high fever (over 41 degrees C) in the first few days after the burn. This is observed in adults only if they are burned extensively but in chil dren, and particularly infants, it may occur as a complication of small area burns. The occurrence of delinum stupor convulsions, or coma should auggest the possibility of hyperpyrexia. The oral temperature may frequently be musleadingly low. and rectal temperatures should be taken of all such patients. Infants in particular should have hourly rectal temperatures taken during the first 24 hours, and 2 hourly temperatures during the next 24 hours. The pathogenesis of this early high fever is not known. It does not appear to be due to infection since in most instances there are no signs of spreading infection, either at the time of the fever or later Pyrogens in intravenous fluids are responsible only occasionally and dehydration may play a role, but in many cases high fever is seen in the absence of these fac tors. Increased heat production due to the in crease in metabolism as a result of extensive burns together with, and more important, the decreased ability of the patient to lose heat because of the greatly restricted area of exposed normal skin may be important. Walker and Shenken believe that in many cases the fever is cerebral in origin.

The burn patient cannot tolerate a high fever so that if the rectal temperature remains above 41 degrees C for more than a very few hours death is almost certain. I rompt and energetic treat ment directed toward cooling the patient is effective in many instances and this treatment should be started whenever the rectal temperature is above 40 degrees C. If the fluids given have

been madequate, more fined will help but the main attention should be directed to fee water sponge baths to all exposed skin. If less than 50 per cent of the skin is exposed it may be necessary to remove some of the dressings. Windows should be opened, drafts created, bed clothes removed, and an ice water bath made in the pa tient's bed. He should be sponged for 35 hour or more until the rectal temperature is brought to 30 degrees C but not below this.

# PRIMARY LOCAL TREATMENT

# A Introduction.

During the decade from 1930 to 1939, tannis acid, tannic acid and silver nitrate, gentian violet, and triple dye 'displaced to a large extent all former methods of primary surface treatment of turns in the United States and Great Britain and its Dominions. From 1931 to date other forms of treatment have been advocated strongly and have now replaced the tanning methods as completely as the tanning methods replaced the older methods after whether the surface of the colder methods after years earlier.

All methods of treatment of burns have always been based on an attempt to correct some one or more deleterious effects of the burn. Tanne acid was introduced to reduce the external fluid own and to fix postulated toxins in the skin. The dyes were introduced to accomplish the same results and to furnish also an antiespite action. In 1937 Allen and Koch introduced the now well known pressure dressars. They claimed that the pressure reduced both internal and external fluid loss and that infection was reduced by careful initial cleaning and by the rest and protection furnished by the bulky dressing. Originally no antiseptic except bore acid entirent was used.

With the introduction of the sulforamides into the treatment of burns. Pickrell used a solution containing sulfanilamide that was sprayed on to form a transparent eschar. Others used various sulforamide ointments, or merely dusted on the drug and covered it with perroduction or a bland outstend. Gurd combined the cleaning and presume method of Allen and Koch with a sulfathia zole "cream." Others used preformed films containing aufonamides (b) Whether or not sulfonamides were used on the surface they were also given by mouth or parenterally New anti-bacterial agents, such as propamidine, were discovered and used. Finally, with the discovery.

and production of penkellin, it was used loadand parenterally. In order to secure more one pleto rest and more even pressure, pleaster can were introduced to replace pressure dessings is some cases. Recently the washing of burns was given up by Cope (43) and washing, outmests of all kinds, and routine chemotherapy were given up by Levenson and Lund (117). Complete ccision of small area burns on entry with immediate skin grading has been carried out secretily. Delayed excision and akin grading of more are tensive burns have been used by Cope and More (46). Chemical excision of the burn with early akin graft was successful in serious cases (15).

There is still no general agreement as to pomary local treatment. Recently however certain fundamental conceptions have been widely at cepted and have led to a more nearly unified view of treatment. The first of these is that the care of local areas in a patient with burns of any important size is but part of the total treatment of the patient. The second is that the treatment of the patient should be based on methods to correct as far as possible the many physiological and pathologreal changes brought about by the burn. Local pissma loss abould be limited, further contamination prevented, and infection controlled. Any unface application should cause no local or general texis effects. Application of the treatment should be rapid and relatively easy and the least possible attention should be required thereafter It should be stressed, however that no fixed routine can be established for all cases. An understanding of the underlying principles will make it clear when variation in methods should occur

## B Fluid loss

In addition to the harm done by the loss of fluid from the circulation by causing shock, the fluid is harmful to the subcutaneous tissues because it clots there and increases the extracellular pressure with resulting increased fibrous tiesse (75) This results in subsequent impairment of function. This is evident particularly in burns of the hands in which it is often seen that following some dermal or deep dermal burns there is marked limitation of motion of the fingers. On review of these cases it is found that swelling occurs early and persists for some time. In contrast, it is found that in cases of similar seventy in which minimal swelling has been prevented, function is unimpaired (74, 12) It is apparent, therefore, that from the point of view of both local and systemic reactions, one of the features to be desired of any local treatment is that it hmit the amount of internal and external fluid loss.

\*The faramina need nador this name vary. One is Gostons water Brilliant green Arriform 1 Washing of burns. Washing of the burned area opens up previously closed tissue spaces and leads to a considerable increase in fluid loss, as was pointed out in the discussion of Chart 3. The relation of washing to infection will be discussed later.

2 Escharous and pressure dressings and casts. Tannic acid and other escharotics until recently have been widely employed for primary treat ment, in part because of their ability to prevent external exudation of fluid from the burned area. There is no doubt so far as the tannic acid and silver nitrate combination with its rapidly forming eschar is concerned that this end is accomplished. While the use of tannic acid is not desirable because of its toxic action on the liver nevertheless the necessity of prevention of external losses of fluid in occasional dermal burns may be tudged from the following experience experience.

The patient was a 22 month old child weighing approximately 13 kilograms who was admitted to the hospital with hot water scalds involving 25 per cent of his body surface. The burned areas were oozing plasma at a rapid rate. There was very little subcutaneous edema. The surface was treated by the application of petrolatum and pres sure bandages. The external loss of plasma was not arrested and the bandages continued to be scaked with fluid for at least 36 hours. During this time 8 units (2,000 c.c.) of plasma were ad ministered with no hemodilution. This amount of plasma represented approximately three times the plasma volume of the child. In spite of this, shock occurred three times in the first day Had it been possible to prevent the enormous surface loss this very large amount of plasma would not have been required.

It has been our experience that pressure dressings, or casts, applied over outment, have very little effect on the amount of fluid lost externally while the agents which rapidly form eschars do stop surface leakage However treatments aimed at scaling off the burned surface do not and cannot prevent the loss into the subcutaneous tissues. As pointed out by Underhill Harkins (87) and more recently by Glenn and his col leagues (75) this subcutaneous loss in deep der mal and deep burns is considerable and may sur pass the external loss. The latter state that in one of their dogs with burns of the two front feet plasma equivalent to more than one-third of the animal a blood volume passed into the area from the toenalls to the humeroradioulnar joints.

An example of the failure of tannic acid to prevent internal fluid loss may be derived from a re-examination of Chart 2 Shortly after admusion the patient was treated with tannic acid and silver nitrate solutions. Fifteen minutes after such treatment the external extravasation of fluid from the burned areas ceased completely and yet the rising hematocrit and hemoglobin showed that fluid loss continued for many hours. As a matter of fact the presence of increasing subcutaneous edema was easily discernible on physical examination. This subcutaneous loss of fluid has been minimized experimentally in dogs (74) and clinically in human beings, by the use of close fitting plaster casts (12 176) and elastic pressure dressings (5) pressure dressings (5)

# C Local tissue injury caused by surface treatment

It is desirable that no further inlury be imposed on the burned area by the agent used in the local treatment. It has been shown that the escharotics, as opposed to bland outlinents injure viable epithelium. Partial thickness donor sites heal significantly faster under a firm olitiment dressing than under tannic acid and silver nitrate or triple dye (29 97). Healing of dermal burns of the back takes place a few days earlier if olitiment is used rather than either tannic acid and silver nitrate or triple dye (36). Epitheliza tion under a dry gaure pressure (113) or saline pressure (143) dressing proceeds at the same rate as under a petrolatum dressing.

# D Systemic effects of substances applied locally to the burned area

Absorption of certain types of substances from the surface of both second and third degree burns has been demonstrated (132). Therefore, it is important that any agent used in the treatment of the burned area either be not absorbed, or if absorbed, be relatively nontoxic. This is especially important when burns of a large area are being treated. Jaundice and other evidences of liver damage are seen more frequently in patients treated with tannic acid than in those treated with bland ointments (63).

Boric acad ontiment has been used often in the local treatment of burns. Boric acid has no par incular virtues and since it may be absorbed in toxic amounts if applied over a large area of injured skin (150) it had best be avoided and sim ole petrolatum used.

Sulfonamides in soluble form, if used locally may be absorbed in toxic amounts (120). Therefore if used the preparation should remain in effective concentration locally and yet not be absorbed rapidly enough to cause general systemic reactions. Since there is often early oliguria in severely burned individuals, the possibility of

kidney damage secondary to the sulfonamides is increased. A 5 per cent sulfathiancle emulsion from which the absorption is relatively slow has been used with good results (86)

# E. Prevention of infaction

Strict aseptic technique in the handling of burned patients is necessary to prevent additional contamination of the wound.

- I Washing and debridement of burns. Until recently the custom of washing and debriding burns had not been challenged. The characteristic view was that expressed in the following quotation. To cover a burned area with chemical or coagulating solutions without first using every effort to transform it into a clean wound seems to us inexcusable disregard of fundamental surgical principles (5) However it should be borne in mind that a burn is different from the ordinary soft tissue wound initial contamination is alloht and it is rare that subcutaneous tissue and muscle are exposed. The type of debridement practiced in the primary care of soft tissue wounds cannot be carried out in any except very small burns. Even simple washing of a burn has certain disadvantages - the increase in time fluid loss, handling and pain - which make it preferable to omit washing if possible. Routine washing of burns has recently been shown not to be necessary if pressure dressings or casts are used (43, 116) However it is generally agreed by those who do wash burns that it should be done sently and quickly. White soap has been most commonly used rather than tincture of green soap.
- 3 Prevention of further contamination. It is essential that the area be protected from further contamination. When each around a reason are applied, the eachar which is at first intact, soon cracks and further contamination is thereby possible Pressure dressings or casts which remain dry on twisted prevent the entrance of additional organisms. If however the dressing becomes atturated with exudate contamination is possible. This has been minimized by the incorporation of a cellophane membrane in the dressing (14.3).

At each dressing change there is the possibility of further contamination. Consequent, dressings about be done at infrequent intervals. The first dressing should remain in place for about 2 weeks. At the end of this tume most dermal burns are besled and require no further dressing but deep dermai, insized and deep burns are just beginning to slough so that additional dressings are required.

3 Immobilization. The importance of immobilization in the control of infection has been amply

demonstrated The absorption of toxic products, metabolic or bacterial, depends to a large extest, on the lymphatic flow which is reduced considerably by rest of the induced part (12). In contrast to surface sections, pressure dressings with splints or close fitting casts provide for immobilization of the burned area.

4 Chemotherapeutic agents. These agents have been widely used for the control of infection of burns. The sulfonamids have been seed bed locally and systemically but their efficacy is controlling the local infection of the burn has not been clearly demonstrated. When one considers that there is usually a mixture of gram positive and gram negative organisms in the burned am, and, in addition, there is present considerable necrotic tissue and exudate it is not surprising that there is no striking control by the millions mides. In some instances it has been claimed that while the local infection is not controlled, preading infection and blood stream invasion are prevented (13.5).

It must also be remembered that all deep burns will have an open wound harboring organism until the hast grafts have successfully bested and that this may take several months. As it is unlikely that any patient can tolerate effective does of any sulfonamide for this length of time, it is recommended that no general sulfonamide brat ment be given as a prophylactic measure or for any other purpose except for some complication such as neumonia.

Penicillin has been used locally and systemically in many cases of serious burns (117 90, 191 22) When used locally it has the great defect of rapid absorption from the wound. To overcome this objection experiments are being made with special cintment bases such as carbowax! (136) With such a base some penkillin activity may be maintained for as long as 24 hours. A more serious defect is the rapid destruction of penicillin by the action of penicillinares released by bacteria, such as the colon bacillas, that are present in the wound and which are not sensitive to its action. When given intramucularly penicillin has not been shown to reduce in any way the hemolytic staphylococcus infection of a burn Possibly if such an infection were found in pure culture on a burn it might be effective for this purpose, but such pure cultures are seldom seen. Hirshfeld (96) stated that when penicilia was used before and after skin grafting better results were obtained. Levenson and Lund (117) found that it was possible that the change of

\*Carbowax is the sume of sucion of polyhydric glycols. They are water soluble but have the consistency of greene.

technique of dressing in the preparation for graiting associated with the use of pencillilin was more important than the drug. On the other hard, in the few cases in which the cultures from a granulating wound that is ready for grafting in every other way show repeatedly that the hemolytic streptococcus is the only or predominant organism, general pencillin should be used in the dose of \$5,000 units every 2 hours for 48 hours before and after the grait. Under this special condition it has been shown to be very useful

# F Technique of application of a pressure dressing

Under operating room conditions fine meshed gause, dry or impregnated with petrolatum should be applied directly to the wound Over this, sufficient sterile gauze, absorbent cotton, cellucotton, or mechanics waste should be placed so that even compression can be secured by means of a firm, wide bandage. If the padding is fur ambed in large rolls of material from 1 to 2 cents meters thick 20 centimeters wide, and 4 meters long it facilitates the application. It should be emphasized that to be maximally effective the dressing should be applied as soon as permitted by the general condition of the patient, since the greatest amount of swelling occurs in the first few bours following injury. Also since the swelling is not limited to the burned areas, but occurs also in the immediately adjacent areas, these areas must be incorporated in the dressing. In burns of the extremities the dressing must extend distally to cover completely the hand and foot, even if these areas are not burned, otherwise the venous return will be obstructed, and as the back pres sure builds up the arterial blood supply will be impaired. Elevation of the extremity may help to prevent stasis and discomfort. In applying a pressure dressing the tension must be uniform and care must be taken that no more pressure is used than is required. In burns of the chest and abdomen a pressure dressing as such cannot be applied without interfering with the patient a respiration. Therefore, in this location a firm bulky dressing without pressure is used.

# G Technique of application of close fitting casts

The application of close fitting plaster-of Paris casts is recommended for burns of the extremities particularly for burns of the hands, but it is not recommended for burns of the trunk, but tocks or head. Under operating room conditions, one layer of sterile fine meshed gauze, dry is applied to the entire area to be covered by plaster. This is covered with four layers of sterile open mesh gauze, fitted carefully without overlapping.

Plaster slabs are then molded over the extremity front and back. A thin layer of rolled plaster completes a nearly skintight, light, well fitting plaster cast. The cast must be close fitting but must be applied without compression at any point. As in the case of a pressure dressing it should extend proximally from 7 to 16 centimeters beyond the limit of the burn In burns of the ex tremities it must extend distally to cover completely the hand and foot (including the tips of the fingers and toes) even if these areas are not burned otherwise the circulation will be seriously unpaired. Hands should be put up in the position of function with a slight cock up at the wrist and fingers in neutral position. It is all important that directions be followed exactly (12 116) Levenson and Lund have seen instances in which improperly made casts had to be removed to prevent gangrene.

# H The use and technique of petrolatum gause dressings

Allen and Koch Cope (42) and others advise pressure dressings for burns of the face head, and neck, as well as for those of the trunk and ex tremities. After using them on a number of patients Levenson and associates (113) have given them up in treating these particular burns. Two reasons led to this decision. First, such dressings were always uncomfortable when used for serious burns. Second, sufficient pressure could not be used to control the edema of the face or neck They now use sterile petrolatum gauge strips applied without pressure and without bandage. These strips rub off from time to time and new ones are put on by a nurse. They are rectangular and approximately 8 by 16 centimeters. They are made of fine mesh cotton bandage material impregnated with petrolatum and sterilized. Other areas where pressure dressings are impractical are the genitalia and the anus. Petrolatum strips are also used there.

When this treatment is used, the hazard of contamination is increased. However this has and is great in burns of these areas with any known treatment. It may be reduced by isolating the patient, by using sterile bed clothes, and by careful aseptic nursing procedures.

## SECONDARY SURFACE TREATMENTS

The first pressure dressing or cast should be left in place for 2 or 3 weeks except in the few very superficial dermal burns that have probably healed prior to this time. A foul odor contamnation of the dressing by urme or feces, and evidence of infection under the dressing should rarely be

considered indications for a change at any earlier time. If the dressing becomes loose or alips it should be repaired by adding more sterile maternal new outside handages, and new adhesive.

Changes of dressing should be made under aseptic conditions in an operating room. The patient should usually be prepared by a mild seda tive. Anestheria may be needed in rare severe chronic cases at many late dressings. Cyclopropage is the anesthetic agent of choice. On removal of the dressing the status of the wound is appraised and the further needs of the patient are estimated. Dermal burns will usually be healed in 2 weeks but deep dermal, mixed, and deep burns will be covered with soft foul slough Purulent material and loose slough may be wiped off gently but no antiseptic solution should be used. In these cases some remaining slough will be present from 20 to 40 days. The second and all subsequent dressings should also be pressure dressings applied with the same technique de scribed. As soon as large areas have become free of slough and if the granulations and the patient are both in good condition grafts should be applied without waiting for the adjacent slough to separate. In addition to the chemical debridement" which will be described, many varieties of dressings have been suggested to speed the separation of the slough as well as to control infection. In general, every method, and this includes the one recommended here, has disadvantages as well as advantages. Frequent changes of dressings, wet, dry or with ointments, traumatize the wound and increase the danger of bacterial contammation, and the process of changing them is wearing to the patient. Antiseptic solutions or ointments may injure the granulations, the patient, or both and never eradicate infection. Pressure dressings applied to several extremities produce such immobility of the patient that he loses strength rapidly. On the other hand less confining dressings fail to control the pain from friction and allow more contamination. Both are weakening

Tub baths and shower baths have been recommended (137). In general these are difficult to arrange and are infrequently used at present in the United States. A good method of providing continuous or intermittent irrigation with saline or Dakins solution of the extremities has been devised by Bunyan. He uses transparent plastic envelope that has two rubber tubes sealed into its sides. It is troublesome to use.

During the last s years Levenson and associates (113) have abandoned all previous forms of secondary treatment and apply infrequently changed

dry pressure dressings or casts to the extremus and similar nonpressure dressings to the trusk. Even the use of frequently changed wet dressing just prior to grafting has been discarded (11). The only exception to this treatment of these areas is when very small scattered areas of guanlation are left at the edges of the grafts. Under these conditions nonpressure frequently changed petrolatum dressings are used.

## SKIN GRAFTING

Until the advent of the Padgett dermatone he technique of skin grafting burns of large area wa difficult and was mustered by few surgeos. The sumplest technique, but least satisfactory is that of Revertin. Somewhat more difficult, but more astisfactory is that of Thiersch and much medificult, but most satisfactory if successful, are the whole thickness graft and the pedicit grift. There is a great tendency particularly among surgeons who treat burns only occasionally to wait many months before doing any graft to silve nature to make its maximum efforts at being With such a laisses-faire policy burns adjacent to the joints lead to cruppling contractures and deformities.

If Reverdin grafts are used early placed closely and take, they will grow out, cover large area and at least in part, avoid contractures. However the skin surfaces (both recipient and doore) are always aporty' and seddom satisfactory Expertly cut Thierach grafts stretched to somitienson and completely covering a noncontracter granulating surface are much more astisfactory in fact, the grafted skin approaches normal skin appearance and function, and the door site often becomes invisible.

Whole thickness grafts are of very hite moortance in the treatment of large burned area. For small specialized areas, such as the syelling face and neck, they are essential, but the care of such defects is in the field of much more specialized plastic surgery than is within the scope of review. The same is true of pedided grafts.

# Immediate excision and skin grafting

Immediate excision and skin grafting has been carried out by several authors (197). It is theoretically sound because after a deep hum is excised and the wound grafted, the area is healed in a week or 10 days. However it has a very limited applicability and is indicated only in drawnsly deep burns of very small area in which there is little likelihood of shock. Relatively few deep burns come in this category. Even with a small burned area the operation is a long one be-

cause of the difficulty of securing complete hemo-

# B Delayed excision and skin grafting

Delayed excision and skin grafting has been carried out recently in a number of cases by Cone and Moore (46) It is their practice to give large amounts of penicillin intramuscularly and locally through Dakin's tubes incorporated into a pressure dressing at the time of burn From 3 to 7 days later when the shock has been satisfactorily treated and the general condition of the patient is good the burned area is excised and grafted at one operation or grafted later within a few days. If the area is very extensive, the procedure must be done in stages. The same procedure, begun at a later date, between the tenth and fourteenth days, has been followed by Ackman and his associates (3) In their technique no parenteral chemotherapy is given but a sulfathiazole emul sion is used locally. The results of these procedures have been excellent, and the method has great promise in the hands of surgical teams experienced in dermatome grafting operations and in the care of surgical shock. Blood transfusions to the amount of several liters may be needed at the time of and immediately after these operations.

# C Skin grafting after sloughing

Burns are grafted in most clinics in the granu lating stage. The time when the slough is com pletely separated is usually between the third and with weeks. Sloughs on small and more vascular areas, such as the face, separate more quickly than those on larger and less vascular areas. Recently attempts have been made to speed up the time of separation of the alough by the application of various solutions such as the proteolytic en symes, papain (41) or pepsin (100), or by the application of pyruvic acid in a starch paste (39) (chemical debridement) With the latter method the sloughs of deep dermal and deep burns may be removed in from 6 to 10 days without injury to any epithelium that may be present in the more superficial areas, or to the granulation tissue. Some very impressive results of its use in severe burns have been reported

When the condition of the patient is satisfactory the granulations are firm and pink, and the chances of successful skin grafting are good When unsatisfactory the granulations are edema tous and finable, and the chances of successful skin grafting are poor In most cases granulation tissue is not removed. However exuberant but firm granulations, if removed down to a firm yet.

low base, are no contraindication to grafting Bleeding is controlled by warm saline packs or the application of thrombin (51)

# D Technique of dermatome skin grafting

The Padgett dermatome (145) has many ad vantages over the knife or razor for cutting Thiersch grafts. Sheets of even thickness may be cut from parts of the body that could not other wise be used as donor sites. Any thickness of skin, from o 15 mm. to full thickness of the skin, may be taken. Grafts should be between or 5 and o 30 mm. thick. The amount of skin transferable at one operation is limited by the patients general condition. Patients should seldom have more than four drums of skin grafted at one operation. Very sick patients can tolerate only two drums.

I Anesthesia. Although it is possible to cut grafts after infiltration of the skin and subcutaneous tissue with procaine it is much more time consuming and difficult than to cut them under general or spinal anesthesia. Patients with extensive wounds do not tolerate ether nitrous oxide and oxygen spinal or pentothal anesthesias well Cyclopropane is much safer and is very satisfactory Levenson and his associates (113) have used it in several hundred operations with out any complication.

2 Choice of donor sites. Any part of the trunk, the whole circumference of the thigh or arm, and the posterior surface of the calf may be used as donor sites. Smooth areas on the thighs, chest, abdomen and back that are not too hollow or too sharply rounded are the areas most easily used. If the patient cannot easily remain prome for a few days, use of the back will cause post postative discomfort.

3 The operation Before the patient is anesthetized the dermatome knife should be inserted in its slot with the beyel away from the drum and its edge adjusted to cut the desired thickness of skin. This is done by setting the flange plate at zero and bringing the blade flush with the drum by turning the two adjusting screws at the sides. Then, turning the flange plate the required num ber of graduations will set the blade at the correct distance from the drum. The flange plate is graduated so that one division equals 0.025 mills meter. While the patient is being anesthetized the donor site is prepared with any standard method of skin preparation. If the wound dressing is removed at this time care must be taken not to contaminate the donor site, the instru ments, or the team that will take the graft. After sterilization the donor site must be washed carefully with ether to make the akin absolutely dry Then the drum is coated with an even thin laver of the special rubber cement that is furnished with the dermatome. Another layer of cement is then put on the dry skin. This is allowed to dry for from 2 to 5 minutes until it has lost its shiny moist appearance. The dermatome is then emsped in the surgeon s left hand with the back of the blade reating on his wrist. The distal edge of the drum is placed on the distal edge of the donor site and pressed down firmly for a minute. The edge is then raised about 136 centimeters by rolling the drum. The blade is then brought into contact with the skin by the right hand. Cutting is accomplished by short quick strokes of the blade while the left hand rolls the drum slowly toward the proximal edge of the donor site. The skin in contact with the knife should be under slight tension by being lifted by the adherent cement, while the skin about a centureters proximal should be compressed by the drum. After from 1 to 2 centimeters have been cut an assistant should inspect the graft to determine its depth. If it is not correct the cut may be made thicker or thinner by moving the flange. This is done without removing either the drum or the blade from their positions. At times it may be necessary for the assistant to press down on the skin just lateral to the drum to keep this skin from inter fering with the stroke of the knife or from being cut irregularly. When the proximal edge of the drum is reached the graft should be cut free with a separate scalpel. It is then picked up with small hemostata, peeled off the drum and laid on a sponge moistened with salme solution. Powdering the more surface which is sticky from the rubber cement with sulfanilamide will make it much easier to handle. Other grafts are then cut if necessary. After all the grafts to be used are cut. the donor sites are covered with one thickness of fine mesh nylon or rayon and a few layers of gange and towels to protect them from contami-

nation during the remainder of the operation. The area to be grafted is then uncovered, the skin around it aterilized and draped, and the wound surface is cleansed by applying moist sponges which are then removed without rubbing. The grafts are then laid on the wound in the largest possible pieces that fit. When the areas to be grafted are small or irregular in shape the grafts should be cut into pieces that fit. When ever possible, the grafts should come at least to the edges of the wound, and preferably they should overlap the edges algabity. Unless the method of using a "backed" graft, which will be described, is used, the graft should be stretched

to normal aidn tension by satures from 5 to 6 millimeters apart around its edges. A pressur dressing over the graft, which is straped and bandaged into place so that it cannot possibly ally is essential. If the graft is on an extremity a plaster cast fixing the Joints above and below the area grafted is also important.

The donor sites are now bandaged over the tenporary dressing. If the donor site is on the usterior surface of the body arms, or legs, the whole dressing should be removed down to the single layer of nyloo or nyon as soon as the patient is in bed. This should be exposed to the air to allow a dry scab to form which will protect the wound. This should be left in place mill it falls off spontaneously after healing has taken place in z or x weeks.

4. Backing for dermatome grafts (78) The technique just described gives very satisfactory results that is time consuming because in order to stretch the grafts properly it is necessary to use a great many sutures. Usually the suturing is the longest part of the operation. When the grafts must be subdivided it is especially difficult to handle the pieces. Webster has recently shown that pilo limit may be used as a backing for grafts, and Evans (64) has suggested cellophane for the same purpose.

Before a graft with a backing is cut the drum is coated with dermatome cement and the backing film cemented to the drum as smoothly as possible. New coats of cement are then applied to the film and to the donor site and the graft is cut as described. The graft with its backing is removed from the drum and is placed on the recipient site. The backing prevents the normal contraction of the skin that results from its elasticity and gives it added strength. The handling of the cut skin is consequently much easier and any cutting of pieces to fit small or irregular areas is more easily performed. More important, however is the fact that no autures are needed to maintain the graft at its original size and tension. The grait is maintained in place by even elastic pressure provided by a suitable pressure dressing. The back ing is easily peeled off after the graft has healed

Experience with cellophane as a backing material has shown that it is difficult to apply this substance to the dermatome without its which the substance to the dermatome without its which is the control of the contro

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faces that are convex, concave, or irregular wrinkling frequently results. This may lead to aress where serum or blood collects beneath the graft because of poor approximation to the granu ations and over these areas the graft may be lost.

Fine gauge nylon1 or similar rayon has proved to be more useful than cellophane. In the first place it never wrinkles on the dermatome drum Secondly it sterilizes as easily as any textile and does not need special packing in the sterilizer to prevent adherence of its adjacent surfaces. It is unchanged physically after sterilization. In spite of its relative limpness before it is attached to the skin, it prevents contraction of the graft and sutures are unnecessary Grafts backed with nylon conform better to irregular surfaces than do those backed with cellophane. In addition it has been found that it is possible to cut the akin from 0.15 to 0 20 millimeters thick. Such grafts are slightly thinner than those which can be successfully cut and handled without backing donor ates from which such thin grafts have been taken heal very rapidly and can be used again in a relatively short time. On all areas where split thickness grafts are satisfactory grafts of this thickness have given as satisfactory end results as slightly thicker ones.

# E. Homografts

Homografting or the use of skin from some one other than the burned individual is in the nature of a temporary dressing since such grafts disappear in from 3 to 6 weeks. The only permanent homografts have been transplanted from one identical twin to another (23) The blood group as such appears not to have any important bear ing on the success or duration of this type of graft. Homografting has a limited but definite, application in the care of patients, particularly children with extensive burns. With the granu lating areas covered, though only temporarily the general condition of the individual improves so that by the time the grafts dissolve autografts may be made Ackman (2) has had a large series of cases in which these grafts were used successfully

## NUTRITION

As noted in the earlier section on nitrogen metabolism there are great early losses of nitrogen in the urine and losses from the surface of the burn until epithelization is complete. The fact that low plasma protein levels and hypoproteinemic edema occurred late after burns was noted by

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several investigators between 1030 and 1040. A fine report on this subject was that of Clavelin and Hugonot. There was very little of practical value that could be done at that time to improve the nutrition of their patient and an amputation had to be performed. When human plasma and serum became available they were used to combat this nutritional edema and following the attack on Pearl Harbor they had their first large scale clinical trial for this purpose. The results of plasma treatment of patients with edema were in no way as striking as the results of treatment of shock in burns. Plasma is inadequate as a means of combating the edema, which is a nutritional edema, because of the small amount of protein furnished by large amounts of plasma when compared to the needs of the organism. One liter of therapeutic plasma contains only about to grams of protein which as will be indicated is only a small part of the nutritional need of the patient with edema.

The estimation of the status of a burn patient with regard to the presence or degree of protean deficiency is not simple. The factors necessary for a critical evaluation are (1) optimum weight of the patient, (2) observed weight of the patient (3) plasma protean level, (4) plasma albumin level (5) plasma volume, (6) mitrogen intake and (7) nitrogen output. Actually, main reliance in climical work has to be placed on a nutritional history on the patient's weight, and on serum protein determinations done most simply by some densitionneter method.

Elman (60) was the first to stress the patient s weight in evaluating protein depletion. It is practical to weigh bedindden burn patients by weighing them on a stretcher at the time of dressing changes just before the dressing is removed and then weighing the removed dressing and the stretcher. As soon as a surgeon commences to weigh his patients with burns he will be amazed at some of the losses encountered in patients that do not have very severe burns. Losses of more than 25 kilograms have been reported as occurring in a few weeks after a severe burn in spite of efforts to maintain nutrition (128).

Failure to meet the increased nutritional demands of the severely burned patient results in progressive loss of weight and strength edema, friable granulations, increased local infection and, finally, death from maintrition. It is preferable to anticipate the requirements of the patient and to meet them before sever maintrition occurs. In the very severely burned patient this may require as much as five or more times the normal intake of nitrogen. It has been indicated that the principal

foodstuff required is protein. However, the food provided must be an adequate metabolic mixture containing in addition to adequate amounts of protein sufficient calories, carbohydrates, minerals, water and accessory food substances. Whenever possible, protein losses or deficiencies should be corrected by oral feeding. It is not enough for the surgeon to order a 'high protein. high caloric, high vitamin diet. If such a diet is ordered the patient may fail to benefit from the order for any one of the following reasons (1) the diet presented to the patient is not as speci fied (2) the diet presented is not eaten in whole or in part because it lacks palatability there is lack of appetite, and there is a lack of nurses to encourage eating and (3) food eaten may be partly or wholly lost because of diarrhea or vomiting

The three items lasted under No. 5 are interrelated. It is common experience to find that a sick patient has no appetite. However if special attention is paid to the likes and dislikes of the patient and special or other numes are available to encourage eating and to offer means when the patient desires them instead of only at stated routine periods, many such patients will eat a surprisingly large amount of food.

The two items under No. 3 are also related to each other. Forcing the diet in a sick patient does not always result in a net gain. Nausea, vomit ing distention, and diarrhea singly or together are limiting factors. In general the sicker the patient the less fat is tolerated, and the larger the proportion of protein that is required. It has been found that at least 25 per cent of the calories in the diet should come from protein and not over 15 per cent from fat if any of these intestinal symptoms have occurred recently. Some patients will need 50% of their calones in the form of protein. It is well to take a number of days to increase the food mtake, as sudden increases are more likely to be followed by gastrointestinal symptoms. More cautious increases will prevent such symptoms. If the diet is not tolerated, protein in the form of a digest should be tried and frequently will be well tolerated. The available digests are not particularly palatable and should be given by intubation if refused by the patient.

Intubation feeding is important and may be used to increase the intake of food greatly Medium caliber masal stomach tubes are used and left in all the time or for many bours a day. If left in continuously the tube should be removed every third or fourth day for cleaning. About 500 cubic centilineters may be given at a time, spaced between meals and at night but there is a

wide variation in the amount and frequency of supplementary tube feedings that different patients will take. It is well to start with half skimmed milk and half water or with a muture of protein hydrolysate and carbohydrates and in crease the strength and quantity of the mixture over a period of days. Instead of supplying the mixture in intermittent doses, a drup apparation may be used which can, after a short period of training, be regulated by some of the patients themselves. If from 125 to 150 grams of protein and from 2,000 to 2 500 calonies are given by mtubattion in addition to an average bone diet, the patient should receive a total of about 200 grams of protein with over 4,000 calones.

Some of these patients will require protein and carbohydrate supplements given intravenously as well as by intubation. This has already been discussed by Tagnon and associates (173) and by Lund and Levenson (125) and by

Elman (59)

As noted in an earlier section there is an acute hemolytic process starting immediately after an extensive deep burn and continuing for about 72 bours. The actual number of red blood cells bemolyzed during this period is usually relatively small. However following this there is a chromanemia which continues until healing is complete.

This anemia is progressive and its chronicity and severity are roughly proportional to the extent of unhealed deep burn. It does not respond to large intakes of iron liver extract, protein calones, and vitamins, although these must be given for nutritional purposes. Blood transfersors are necessary at frequent intervals and in large amounts to maintain the hemoglobin at a satisfactory level. In the past it has usually been rec ommended that the burn patient should be transfused with type specific blood when the hemoglobin falls below 75 per cent, but it has been learned that he does better when his hemoglobia is kept above 85 per cent. To accomplish this may require as much as I liter or more of blood every week during the patient s entire course of illness. If available, red blood cells suspended in saline solution are as satisfactory as whole blood (172)

The cause or causes of this chronic anemia are poorly understood. One factor may be chronic hemolysus. In support of this concept Moors and Cope (40) have found an increased excretion or ed cell breakdown products. Emerson and Exert recently demonstrated that pooled plasma and type O whole blood given to patients with type A B or AB blood induces a persistent and sever

hemolytic process. This is detected by finding an mcrease in bilirubin in the plasma. Hemoglobinemia and hemoglobinuria are not found Another factor in some cases is loss of blood into the dressings. This is particularly marked when the granulations are 'poor' and edematous in nationts that are not in nutritional balance. The hone marrow is not markedly depressed as the reticulocyte count frequently reaches 5 per cent

# SEX HORMOVES

In severe burns in young women menses cease and do not commence again until healing is nearly complete. At the same time these patients develop an abnormal growth of hair especially on their arms and legs. This hair disappears about the same time menses recommence (115 47) No similar change is noted in men. Attempts to treat the metabolic effects of burns with a growth promoting sex hormone (testosterone) in the early stages have not met with success (24 os) Recently following a suggestion made by Browne (24) testosterone propionate has been used with considerable clinical success in the late stages of burns at the Boston City Hospital. It was not possible to study the nitrogen excretion in these cases, but clinically they responded in a manner that indicated an increased positive nitrogen balance. The pain decreased, the granulations improved, the appetites increased, and weight was gained very rapidly. The dose used was 10 milligrams per day given intramuscularly. This hormone has given this good effect to patients of both sexes.

## REFERENCES

- 1 ARROTT, W. E., MEYER, F. L. HUSCHYELD J. W. and GRIFFIN, G E. Surgery 1945 17 794-804. \*2 Acress, D Personal communication.
- ACCEAN, D., GERNIE, J. W. PRITCHARD, J. E. and MILLS, E. S. Ann. Surg., 1944, 119 171-177 4. ALDRICH, R. H. N. England J. M., 1933 108 199-
- 5. ALLES H. S., and Kocze, S. L. Surg Gyn. Obst., 1942, 741 914-924.
- SA ANDREAE, W A., SCHEULBER, V and BROWN, J S L.
- Pederation Proceedings, 1946, 5 3 Axprus, W DEW., and DDROWALL, J A III. Ann
- Sur 1944, 119 691-690
  7 Aun. J C. N England J M 1944, 231 71-75.
  8. Aun. J C., Pitthan H., and Bruze, A. M. Ann.
- Surg., 1943, 117 534-630.

  9. Barre, R. D. Am. J. Path., 1945, st. 717-733.

  10. Barre, S. L. and Nodos, E. C. Brit. J. Exp. Path
- 1925, 6 147-160. 11 BANDERS C. R. Johns Hopkins Hosp. Rep. 1898,
- 12. BARNES, J. M., and TRUETA, J. Lancet, Lond., 1941
- #13. BEARD J W and BLAZOCK, A. Arch Surg. 1931 22 617-615

- 14. BEZCHER, H. K. Ann. Surg 1943, 117 825-833.
  15. BELOTY A and PUTERS R. A. J. Physiol., 1945.
- 103 461-476 BERKOW, S G Arch Surg 1924 8 118-148.
- Idem. Med J & Rec. 1931 134 386-389 18. BETTHAN A G 1 Am M Ass. 1917 108 1400-
- vio Broc R. J Bull. Johns Hopkins Hosp 1944 74
  - 161-176
- 20. BLACK D A. K. Brit, M J 1040, 2 603-607 ST BLALOCK A. Prevention and Treatment of Shock Burns, Shock Wound Healing and Vascular Injuries. Military Surgical Manuals, National Research Connell, Philadelphia W B Sannders Co.,
- 22. BODENHAM D C. Lancet, Lond. 1043 2 725-728.
- 33. HOWN JB SURGEY, 1931 \* 158-728. 38 HOWN JB SURGEY 1931 \* 158-601 Bone and Wound Healing (Dec. 11 and 12 1944, p. 37) Josish Mary Jr Foundation, New York. 25 Browns, JS. L. Schissker V. such Structure J A. F. J. Clin Invest, 1944 \* 23 932 56 Buys L. J. and Harman, F. W. Am J. Clin

- Path, 1941 II 275-187 27 BUNYAN J Proc. R. Soc. Med., London, 1940, 34
- 65-70. AS. BUREARDT, L. Arch. klin Chir., 1905 75 845 866
- 20 CANNON B and Core, O Ann Surg 1043 117 85-02.
- 50. CANNOY W B Traumatic Shock. New York and
- 30. CANNON W B TRIUMBLE Shock. New York and London D Appleton & Co. 1933.

  31. CRAINOT I L. Personal communication

  42. CHRISTOPH, L. Presse midd, 1938, 46 1054 1055.

  53. CLARK, A. M. COLEBRON, L., GIRSON T., and TROMEON, M. L. LAINCE, LOND 1031 1605-606.

  44. CLARL, E. J. and ROSSITTE R. J. Q. J. Exp. Phy.
- giol Lond., 1944 32 279-300. 35. CLAVELIN and HUDONOT Bull Soc. med. boo
- Paris, 036, 52 1144-1179
  36 CLOWES, G. H. A., JR., LUND, C. C., and LEVENSON
- S. M. Ann Surg 1943, 115 761-779.

  57 CORN E. J. Actualités Médico-Chirurgicales. I
  La transformon sanguine. B. Etude biochemique. New York and Brussels Belgian American Educa
  - tional Foundation, Inc. 1945 18. Committee on Foods and Nutrition, National Research Council. Recommended Dietary Allow ances. Washington Autritional Division Federal
- 39. Coveror, G. J. and Harvey S. C. Ann. Surg. 1944 120. 301-166.
- Surg 1944, 120 873-875.
  41 COOPER, G R., HODGE, G B and BEARD J W
- Am J Dia Child, 1943 65 905-916.
  42. Core, O Ann. Surg. 1943, 117, 835 893.
  43. Idem. N England J M 1943 229 138-147
  44. Idem. Personal communication
- 45. Corr, O and Moore, F D J Clin. Invest., as
- 241-257 46 Idem. Personal communication.
- 47 COPE, O NATHAMSON I ROUNKE, G M and Wilson, H. Ann Surg 1943 117 937-938.
  48. CoTul, Wright A. M., Mulifoldand, J. H.
  Barchau, L. and Brefd E. S. Ann Surg 1944
  - 110 815-813. 40. COURNAND A., RILEY R. L. BRADLEY S. E. BREED E. S. NOBEL, R. P., LANSOV H. D. GREGERSON, M. L., and RICHARDS, D. W. SUIGERY 1043 13 004-005

Carre, G. W. An Experimental Research int. Sur. gical Shock, Philadelphia Lippincott Co 800 51 Crommura, E. P. Lozatta, E. L., and Dramma, I

M. J Am. M. Ass., 044, 2 52. Curlino T B Med Chi T 24 976 London, 1842, es 160-181

53. COTABRETSON D P Brit. J Surg 936, 3 505 520. Dividade, E. C. Arch Surg., 926, 13 262-177

SS. DINGWALL, J A. III Ann. Surg Qu. 8 427 có Duruttata G Lecons orales de clinione chimpel-

cale, Article a des brûberes. Vol. 4, pp 3 3-601. Paris Germier Halluere 837

57 DUVIL, P. ROUX, J-CH., and GOUFFON Presse modd, 1934, 42 785 1787 58. ELLINTON J. R. WOLFF W. A., and L.T. W. E.

Ann. Surg., 640, 12° 50° 57
ELMAR R. Ann. Surg., 944, 20° 350° 36
ELMAR R. COT, W. M. Js., LINGHER, C. E., and
MUELLER, A. J. Proc. Soc. Lap. Blol., N.Y. 942,

5 350-35 62 Emersors, C. P. Jr. and Empart R. V. Personal

communication. 63. East L. H., Mo us, E. M., and Parwers, A. W.

Ann. S rg 013, 7 \$34-\$55. Evans, F I Personal communication. EVANS, E. L. and Bioors, I A. A n. Surg., 945.

122 601-705 66. FIRE, J I AM AM II and Seed MAM. A. Ann. Sure-

945 652-662 67 FINE, J and STI CMA A J Clin. Invest., 944, 3

730-730. 68. FINLAND, M. D. VIDRON C. S., and LEVERSON, S.

M Cholcal and Therapeutic Aspects of the Configration Injuries t the Regardatory Tract Sustained by Victims of the Coccanut Grove Disaster Medicine Balt I press.

So. Fox, C.L., J Am M. Am., 044, 4 207-2 nd K row A. Sungi Gyn. Obst., 945, 80 50 507
FRANK, H. A. SELIOM, N. A. M. and PINK, J. J.

CUn. I west 945, 24 435-444.
72. GIBBON J G., ND, and C ANS, W. A., Jr. J Clin.

J73 GILLIOAN, D. R., ALTECHULE, M. D. and KATERSEY

V73

E. M. J. Clin. Invest., 943, 30, 77-87,
74. GLEON W. W. L. GUERRY, H. H., and DEINKER,
C. K. J. Clin. Invest. 945, 22 509-525.

475. GLEON W. W. L. PLYTERSON, D. K. and DRINKER,

Sc., 926, 7 682-696 So. GURD F B ACKER II

ACKE H D GERRIE J W PRIT CHARD, J. E. and MITLE, E. S. Ann. Surg 6 64 -657

HALL, M. G. DARLING, R. C., and T. YLOR, F. H. L. Ann I t. M. 939, 3 4 3-432. HALL, W. K. Proc. Soc. Exp. Blol., N.Y. 938, 38

46-48 √83. HAM, A W An Surg 044, 20 689-697

A4. Ibid 944, so 608-706. 5 5-4

86 Idem. Ann. Surg., 1935 or 444-454 57 Idem. The Treatment of Burm. Springfeld, Ifficial C. C. Thomas, 925. 83. Idem. Surg Clin. N. America, 1943, 27 1845-752 80. Idem. The General Treatment of the Fathent with . ₿7

Severe Burn: Burns, Shock, Wound Healing, and Vascular Injuries. Military Surgical Manuals, N tional Research Council. Philadelphia W R.

N DOBAL ROBERTO COURSE.

Samder Co. 1943.

50. Idem. Physiol. Rev. 1945. 551 531-778.

HARTER, H. N. COPE, O. Evans, E. I., Perutire,
R. A., and RUMANDA, D. W. (Memorandum prapared by committee appointed by Dr. Alfred
Nislock, Chaltrona of the Committee on Shock, National Research Council) J Am. M. Am., oac 188: 475-470. 03. HAREDYR, H. N. and LONG, C. N. H. Am. J. Phy-

on Harether, i.i. N. and Lorde, C. N. H. Ara, J. Pry-nol., 945, 446 dd - Gartheec, H. L. Ana, Serg, J. Harthaus, F. M., Rose, W. G., and Serrer E. P. Am. J. Physiol., 976, 781 at-req. 1981, 1981, 1981, 1981, 1981, 1981, 1981, 1981, 1981, 1981, 65, Hirssfrita, J. Pernosia communication. 65, Hirssfrita, J. Pernosia Occumunication. 66, Hirssfrita, J. Pernosia, J. A., Bocca, C. W. and Amorri W. E. J. Ana, M. Ass., 944, 1951

17- 10

97 HHERENTEID, J. W., PHILIPO, M. A., and MASSE, M. E. Song, Gyn. Obst., 1943, 76 546-551 98 HHERENTEID, J. W. WHILLMS, H. H., ASSOTT, W. E., HHELES, C. G., and PHILIPO, M. A. ARS. Song

1944, 15 765-775.

99. Howard, J. E., Farrow, W. Stein, K. E., Ectisperio, H., and Reidt V. Bull. Johns Hopkins

PERO, H., ROM KEIDT V ROLL JOHN HOPENS HORP, 044, 75 50-168.

CO. HOWEL, F. L., De, Dersonal communication JAMES AV. C. A., GRESON, S. T. WOODMUT L. M., HETI, J. T. BALLEY O. T. and NEWBOOKER, L. R. J. Chn. Invest., 044, 23 465-400.

JOHNSON, G. S., and HALDEN, A. Arch. Song. 934,

1 855-863.

L. KARAT, H., and HEDER R. F. Surgery 766-776.

ا مد ا KAYAMIRA, K. Talwan Igakkal Zembi, 910, 39-80. Idem. Talwan Jenkkai Zasahi, 040, 50 1305. Krilaw Y. C. H., and Rawlinton W. A. Austral

J Rap. Blol., 044, a \$3-03 Kommercher E. O and Page, L. H. Arch. Surga-

78- 91 943, 47 78- 91 108 K007 C. E. Surr Clin. N America, 1944, 84-

oo. Lan, C. R. Surg. Gyn. Obst. (I ternat. Abata-

Surg) 041, 72: 300-400. LAMBRET, O., DEFERENCE, J. and WARRENCOURG, H.

C. rend. Soc. blol., 930 23 0-1 LAUSON H. O BRADLET S. E., and COURSAM, A. J Clin. Invest., 1944, 23 35 402. LEE, W E., and REGARS, J E. J Am. M Ass., 944.

J. LEVENSON S. M., DAVIDSON, C. S., GRICK, R. W. and LORD, C. C. Uppeblished observations.
J. LEVENSON, S. M. DAVIDSON, C. S. LORD, C. C., and TAYLOR, F. H. L. Sung Gyn. Obst., 1945 for

440-460 5. LEVENSON, S. M., GREEN, R. W., GOODPASTON, W., LURD, C. C., and TAYLON, I' H. I., Unpublished

observations 1 6 LEVENSON S. M., and LUND, C. C. J Am. M. Ass.,

1945. \$1 \$75-\$77 Idem. N England J M 1945. 331607-6 2.

118. LINCHER, C., ECHAN R., and DAVEY H W War

118. LINGHER, C., ELMAN R., and DAYRY H. W. WAR.
Med. Chic., 1944, § 43-45.
119. LOCKE, E. A. BOSTON M. & S. J. 1902. 147, 480-484.
129. LOCKE, N. J. LANCEL, LOND 1945, 1 609-611.
121. LOKER W. ZBL Chir. 1934. 61 1686-1695.
132. LOWDON A. G. R., MCKAIL, R. A., RAZ, S. L.,
STEWART C. P. and WLESON W. G. J. Physiol.

133, 06 37-28.

133, LUCIDO J AIN. SUIK., 1040, 111 640-644.

134, LUCIDO J AIN. SUIK., 1040, 111 640-644.

135, LUCIDO J AIN. SUIK., 1040, 111 640-644.

136, LUCIDO, C. C., and ENVIRONO S M. J AIN. M. ASS.

137, LUCIDO, C. C., and LUCITRODO S M. J AIN. M. ASS.

135 LUBB, C. C. ARLENSON E. H. L. JOHNSON R. LEYEMON S. M. DAVIDSON C. S., GREEN R. W. and LEWIS, J. Unpublished data.

127 LINGBERG, H., and BACKMAN E. L. C. rend. Soc

blol, 1989, 101 931-934.

128. Lytors, C. Ann. Surg. 1943 117 804-902.

139. MacDonald A. H. Levenson S. M. Davidson

C. S., TAOMON H J., and TAYLOR, F H. L. Science 1944, 99 519.

1913, 117 865-884.
131 MAKCHAMD, F. Die thermischen Krankheitsurrachen In Handbuch der allgemeinen Pathologie. Vol. 1

132. MARON E. C., PANTER, P. and SROIMARER H. A. Ann. Int. M. 1936. 9 850-853

Michigan, R. D. Law C. R., and Rosenne H. B. L. M. 1936. 133. McCaurae, R. D. Law C. R., and Rosenne H.

Ann. Surg 1944 130 387-398. √134. McIvzz, M A. Ann Surg., 1933 97 670-682.

MELENEY F L. Ann. Surg 1943 118 171-186

130 Idem. Personal communication.

137 MOWLEM R. Proc. R Soc. M Lond 1941 34 131-124. 138 MOYER, C. A., COLLER, F. A., TOB, V. VAUGEN H

H., and Maxry D Ann. Surg 1944, 120 367-376.

130. MUUS, J and HARDENBEROH, E. J. Blol. Chem. 1944, 152 1-8.

140. NECHELES, H., and OLSON W H. Am. J Physiol 1941 133 208-209 141 NESSUL, B. H. Am J. Roentg 1930, 13 516-520

142. OLERYCHT, J. Rev. méd., Par. 1924, 41 81-115 143. Owins, N. Surg Clin. N. America, 1943, 23 354

1100. 44. PACK, G T., and DAVIS, A. H. Burns. Philadelphia and London J B Lippincott, 1930.

145. PARGETT E. C. Surg Gyn. Obst., 1939 69 779

\$45 PAREY D H., and SCARFF R. W Brit. J Surg 1944, 32 32-35 47 PERKINS, W M., KOOP C. E. REIGEL, C., VARS, H M. and Lockwoop I S Ann. Surk 1943 118

193-214. 148. PREMAIN, G. E., GLERON W. W. L., and KAUPMAN D. J. Chin. Invest., 1943, 22, 627-633.

149 Perras, J P and Van Styre, D D Quantitative Cfinical Chemistry Interpretations. Vol. 1 p. 294. Baltimore Williams & Wilkins Co. 932 Vol 1 p. 179

150. PPERFER, C. C., HALLMAN F and GREEN L. ]

Am M Ass. 1945 128 266-274. 151 PHERMITER, D B., and LARSTAR, C H Ann Surg

1945 121 803-820. 152 Pickeria, K. L. Bull. Johns Hopkins Hosp. 1941 69 217-221

153. PREMIMAN D. L., JANOTA, M. WESTON R. E. LEVINGON S. O. and Nechicles H. J. Am. M. Ass., 1943, 122 924-928.

164 PRINZERTAL M. BERGMAN H. C., and HIGHTER, O. Surgery 1944, 16 906-913.

RAE, S. L., and WILKINSON A. W Lancet 1014 1 332-334.

156 RAWLDISON, W A. and KELLAWAY C. H. Austral. J Exp Blot, 1944, 22 69-81 157 RHOADS J E WOLFF W A., and LEE, W E. Ann

Surg 1941 113 955-968
1138. RIOUSA J. E. WOLFF W. A SALFONSTALL, H. and
LLI, W. E. Ann Surg 1943 118 982-987
159. RICHL, G. Arch. exp. 1841, Lpz., 1948, 135
160. ROSE, B. and BROWNE, J. S. L. Ann Surg 1942

115 390-390. Rosenthal, S. M. Pub Health Rep. Wash 1943

58 513 522 ROSSITTER, R. J. Bull. War Med. Lond., 1943 4 162

181-180 163 RUDLER, C. Les accidents précoses consécutifs aux bralures superficielles étenducs Pathogenie et

traitement. Libratife Luis Arnette. Paris 1935
164. SALVIOLI I Virchow a Arch., 1891 195 364-397
165. SAYERA, G. SAYERA, M. A. FRY, E. C. WHITE, A. and LONG C. N. H. Yale J. Biol., 1944, 16 361-

106 SRICKR, S. J. The treatment of burns. Lewis Practice of Surgery Vol. 1 Chap. 17 Hagerstown, Maryiand Prior 1937

107 SURN S. C. HAM, T. H. and PLEMING, E. M. N. England J. M. 1043, 297 701-713.

168. SLOCUM, M A., and LIGHTBODY H D Am I

Physici. 1031, 96 35-39.
160 SPIROLER, D. Wien med. Bl 1896, 19 250, 277

294, 310.

770 Tabor, H Kanar H., and Rosenthal, S. M.
Pub Health Rep., Wash 1914 59 637-658.

171 Tabor H and Rosenthal, S. M. Pub. Health Rep Wash 1045 60 373-381

Tagson H. J. Actualités Médico-Chirurgucales. I

Le transfusion sanguine p 15 New York and Brussels Belgian American Educational Founda

tion Inc. 1945
7.1 LAGNON H. DAVIDSON C. S. and TAYLOR, F. H. L. L Alimentation parenterale dans le traitement des affections aigues en médecine et en chirurgie. Actualités Médico-Chirurgicales No. 5 Brussels and New York Belgian American Educational Foundation Inc. 1945

74 JACHON H J LEVINSON, S M DAVIDSON, C. S and TAYLOR, F H. L. The Occurrence of Fibrinolyals in Shock, with Observations on the Prothromian Time and Plasma Fibrinogen During Hemor 7.5

176 477

ish (Inse and Plasma Fibrinogen During Hemoritagie Shock. Am J M Sc., 1906 21: 88.

LAVINE I H. L. LEVEMSON S M., and ADARS, M. A. N. bogland J. M., 1904 279 85-850.

Idem N. Logland J. M. 1904, 231 437-445.

Idem Unpublished data.

TAYLOR F. H. L. LEVEMSON S M., DAVIDSON C. S. BROWNER, N. C., and LOKO, C. C. Ann. Sarg. 178

043 r 8 srg-ssa. History R. M. Surg Gyn. Obst. 1941 72 1018-

Uнипиши I Р J Am M. Ass., 1930, 95 853-857 Uкиккоv G A Klin Med., 1937 15 337-240. Aso.

18

VAN DUWN ] SND Arch Surg 1945, 50 243-252
VAN SLYKE, D D Personal communication.
VALKLE J JR., Personal communication.
VALKLE J, JR., and SHIMKIN H. Ann Surg 1945 18: 181

185 WALLACE, A. B. The Treatment of Burns. London

Oxford University Press, 1941

- 187 WARREN J V STEAR, E. A., JR., MERRILL, A. J and Brannon E S. J Clin. I est., 944 3
- 183. WEBSTER, J P Surg. Clin. N America, 1944, 24
  - 5-180 80 Il KIDEKTELD, S. Arch. Derm. Syph., Berl., 901 6
- 13-56.

  190. WEISLOTTEN H. G. J. Am. M. Am., 9 7 69 776.

  190. WEILS, D. B. Th. Circus Disaster and the Hartford
- Hospital N England J M., 945 #3 6 3-676
  92. Wells, D B Howemer H D and Coll, J J N England J M 1942, 326 639-635.
- 93 WELT, E. Beltr pathologisch, Anat., 250, 4 521-557 94. Wilms, M. Mitt. Grenegeb. Med. Chir 901 8.

- 199. ZAMECCUE, P. C., STEPHENSON, M. L., and COPE, O. J Biol Chem., 945 58 35-55.

# BSTRACTS OF CURRENT LITERATURE

# SURGERY OF THE HEAD AND NECK

Donggan, E. A.: Ocular Findings in Tropical regan, E. A.; Ocusar rimaines in Prophesi Typhus (Tsutsugamush) or Japanese River Typhus Brit J Ophia, 1946 30 11

Donegan reports the ocular findings in a series of Donegan reports the occust minings in a section of too cases of tropical typhus or Japanese fever at the India Burma border. The disease is closely rethe India Burma border. the 19th numb point. The cheese is cusely terminated to the louse-borne typhus which occurred during the many times y family to the many times y family to the polymers. BRIEU ID THE TOUSE-BOTHE TYPING WHITE DECERTED HIS IN THE BEIRES AND IN 100 WOrld WAT I (1014-18) In the Beires and in 100 more than 11 more typing and december and december 11 more typing and december 11 more typing typing and december 11 more typing ty mg worm war 1 (1914-10) in the Baikans and in Rushi and during World War II in Italy as well as Numer and outing yours year it in may as wen as the tick borne typhus throughout the world Rick that the w totals orientally is the causative organism and its meet vector is a mite that is usually found where there B dead wood low scrub and rotting vegets Tropical rats and birds are the reservoirs of

Ninety six West Africans and 6 Europeans were nuncty-six yest Aircans and 0 curopeans were spected. The patients usually presented headaches seekly advantage of the males and the curopeans will be a seekly as ancticu and patients usually presented nessuacie apathy enlargement of the splem and liver pul spaury concretion hyperemia of the conjunctiva, burner of the margins of the optic disc, optic near during of the instants of the Aftrons Many cases showed evidence of the descending neurities described by von Gracle which disappeared without residual

There were only 2 cases of online attorny in the damage to the optic nerve or retina. ancie were only 2 cases of optic arropny in the present series 1 of which was syphilitic The mortal

Paul M: Carernous Hemandoma of the Orbit ity was 4 per cent.

a All Cavernous Hemanatoms of the Original Successfully Removed by Shugrue & Operation Bril. J Obits 1946 50 35

The author describes a cavernous hemangroma of the orbit which was successfully removed by Shu une urint which was successivily removed by Sub-gruss method of operation which involves an ac-NUC a method of operation which involves an approach to the lateral wall of the orbit beneath that rygomatic bone removal of the lateral orbital wall sygomatic bone removal of the lateral orbital wall and removal of the tumor. The major complication of this assessment of the complication of the and removal of the tumor the major complication of this operation is the possibility of mjury to the lateral rectus muscle. The advantage is in the advantage are the support of the tumor which does not interfer with the interest function of the support of the s quare exposure or the rumor which goes not muches with the future function of the eye. In the author's case removal of the tumor gave a satisfactory result

Meetran, P. N.: The Etdology of Trachoma in Ire-Irisk land (Preliminary Communication)

The author discusses the etiology of trachoma in ine author discusses the enology of tracing in triband, where it has recently become more press. inciand, where it has recently become more prevamatch 9 per cent of the cases of blindness in Ireland but only o 81 per cent in Scotland

At present, the causal agent of trachoma is con sidered to be either a rickettsia or a virus. There is some evidence in favor of the rickettinal theory

some evidence in layor of the rickettalal theory Typical rickettalas are not filtrable and they confer There is also evidence in favor of the virus theory immunity

which was advanced in 1907. The infective agent is which was advanced in 1907. The infective agent is which was advanced in 1907. The infective agent is which was advanced in 1907. The infective agent is which was advanced in inclusions composed of intraverse and inclusions composed of inclusions.

nursure the presence of inclusions composed of elementary bodies constitutes the earliest recognizelementary poures constitutes the earnest recognizable change in trachoma and is demonstrable in all

wes at their onser.
Whether viral or rickettaial in origin these bodies waether wire or rickettann in origin titles bodies are considered the causal agent of trachoma. They are considered the causal agent of trachoma. Iney are morphologically industinguishable from those of cases at their onset. are morphologically indusunguishable from those of patients and lympho-

patitacona incusson conjunctivitis and lympho-granuloma venereum. The virus has never been granuloma venereum the virus has never been grown in the laboratory Infection with trachoma does not confer permanent immunity

It seems that the Castaneda positive viruses are It seems that the Castaneda positive viruses are donely related. They may all have a common ances. cosely feined they may an may be been specific differences may have been specific differences may have been specific differences may have been specific differences. try and the specific differences may have been acquired by prolonged residence in a particular acquired by projonged residence in a particular formula species or tissue Johnua Zuckesman M.D.

Pereira R. F. and Tologa, E. E. Dacryosinualita
Simulating a Dacryocanalicultis (Dacrori
nustila simulando una dacriocanalicultis) Sem. and.

The author describes a rather remarkable case in

the author describes a retirer remarkable case in which pus from the ethnold cells was draining when pus from the ethnoid cets was draining through a fistula from the involved anuses and then through a insular from the involved sinuses and then through the superior lacefinal canal into the right

Fluid instilled into the incised inferior lacrimal Find institued into the incoord interior iscrimal which contained a slight amount of pus canal scancil contained a signic minorum of pus passed readily into the nasal cavity apparently asserted the name of the nasal cavity apparently. passed readily into the hasal Cavity apparently through the normal opening into the nose through the normal opening into the nose superior canal was incised but no pus could be excuperior canal was incised but no pus could be excuperior canal was incised. superior cansi was incised but no pus could be expressed from the lacrimal eac. A probe was passed into the nasal cavity in the region of the ethnoid cells and its position verified with x rays

no and the patient was now referred to the ear nose, and the patient was now reteried to the ear nose, and throat department, where the condition was diag. throst upparament, where the common was used to direct examination as hypertrophy of the nosed by direct examination as hypertrophy of the right superior turbinate due to edema of the meatus right superior turbulate due to edema of the meatus on the right side and by roentsenography because on the right and the sinutes on the right side—cs or the opening of an one somewhat the transfer street, the ethnolds and maxillary one a maxillo pecially the eminutes and institute yours a manual ethnoidal sinustra. An operation designated as ethmoids snussus. An operation designated as that of Ermiro de Limas was performed. This operation permits supervision of the maxillary sinus and tion permits our extension on the manually office said at the same time gives access to and permits evacual time of the manual access to and permits evacual at the same time of the manual access to an access to an access to a second access t at the same time gives access to any perints evacuation of the entire etamoid system. At this operation there was encountered intense hyperplasis of the mucosa of the ethmold cells. These cells were full of fetld pus and their intercellular walls were broken

In a few days the patient had healed normally with disappearance both of the secretion into the confunctival sec, and of the fistalous opening into the none. Re-examination a few months later disclosed complete absence of all signs of infection of the none and e-gr fluids passed normally into the none through both the superior and inferior lacrimal canals and the probe could no longer be passed through the firstulous opening into the ethmods region of the none.

De Roetth A.: Hypolunction of the Lecrimal Gland and the Sibgren Byndroms. J Lancet 945, 64 443.

The author states that diminished lacrimal secretion may be due to congenital absence surgical removal, or destruction (by radiation) of the lacrimal gland the presence of toxins, and endocrine dysfunction.

The most marked form of hypofunction is known as filamentary keratikis. The condition is characterized by epithelial filaments which present knobs at their free ends. The less marked type is called kerateconjunctivitus siccs which presents a stringy ropy mucoid discharge, photophobla, burning grit tiness, round gray epithelial dots, and hypothesia of the cornea. The Schirmer test shows only from sto 6 mm, of moistening in a minutes.

Another type of hypofunction occurs as part of the Slogren syndrome in association with dryness of the mouth most, and larynx, due to decreased function of the salivary glands. About 50 per cent of patients with this type of hypofunction bave chronic arthritism.

The mildest form of hypofunction is difficult to recognize It is characterized by rague symptoms such as fatigue or heaviones of the eyes drycens of the nose and month, and difficulty in reading especially by artificial light. However th Schirmer test is positive.

Therapy consists in occlusion of all the puncts, the instillation of tear substitutes such as sodium chloride, egg albumin liquid petrolatum shrodysh or Gifford's solution the administration of ovarian extract, and the removal of foci of infection.

JOSEUA ZUCKERNAK, M.D.

Hymes, G.; Scieral Flap Incision with Scieral Sotures for the Cataract Operation. Arch. Ophia, Chic, 945-34: 374.

The author describes a method of cataract extraction in which a scleral flap incision is made and scleral sutures are used.

After retrobulbar injection anesthesia and akinesia of the orbicularis muscle a superior rectus muscle aiture is inserted for retraction of the cyclail. A conjunctival flap is dissected 3 mm, above the upper limbus, and a concentric wedge shaped seleral flap with its base at the limbus, is then made with the

use of a Lundaguard or Hymes concave knife. This is started at about 1 to y mm, above the upper limbus and the conjunctival stap is left attached to it. The concast section is then made with a kreatone and enlarged with acisson? Before entraction of the extract, a single source is inserted—first through the conjunctive, then through the lower lip of the selers, the upper lip of the selers, and finally through the upper lip of the conjunctive. The loop is laid saide. After the cataract has been entracted the rature is pulled text, and tied

The author is of the opinion that with this procedure, a firmer and more accurate closure of rais ract wounds is obtained and the incidence of post operative complications and of astignation is reduced. JOSEVA EXCENSIAN, M.D.

Chamilin, M: The Effect of Tule in Ocular Surgery Arch Ophila, Chic 1945, 34 269.

The author discusses the effect of tak (generally used on surgical gioves) on the ocular tissues.

In a series of experiments on the eyes of rabbits he simulated the accidental introduction of the line the ocular threes during surgical procedures. He found that tale produces foreign body granulones in most ever

To avoid this undesirable possibility, he recommends directing a stream of saline solution from as irrigator at the surgeon's gloved hands before operation instead of immersing them in saline or other solutions. How the property of the pr

## RAR

Conley J J: The Treatment of Chronic Suppurative Otitis Media with Penicillin. Arch. Order Chic. 945 4 374

Pendillia therapy is of little help in patients with hironic supportative otitis media which has proved resistant to sulfonantide compounds. The response of chronic supportative otitis media to systemic treatment with sulfidiation followed by ,coopconunits of pendicilin is insignificant. The response of chronic supportative otilis media to local pencifing therapy is good 55 per cent of the cases treated were definitely improved. Granulation tessee and cholesteatoms are not affected by sulfadazine or pendicilin, whether administred generally of locally

The best treatment for acute and chronic supportative otitis media is to provent their occurrence by the prophylactic use of one or both of the chemical and biological therapeutic agents.

NOAR D FARRICART, M D

Moreira, D : Gradenigo e Syndrome (Sindrome de Gradenigo) Fol. med Rio., 945 86, 46.

The anthor reports on a patient with a syndrout consisting of acute cities media, neuralize of the trigeminal nerve, and paralysis of the sixth pair of cranial nerves which was first described by Gradenigo of the Royal Academy of Turin in 1924 and since then known under his name. This is the tenth case

prorted in the Brazilian literature and possibly the

openicum in constant with contralateral paralysis nt from brasi with contrainers a parsiyan.
The patient was a Brazilian mulatto 30 years of ine patient was a praximan mulatto 30 years of age who had stropnic minute and upon admittance had been suffering with a supportating left ear for about so days. After repeated myringotomy and about so days. about so days Alter repented myringotomy and intense treatment with 4 and later 3 gm. per day of milianilamide the condution improved, but some or summamure one condition improved, but somewhat over a month later intense temporal and retro-bulbar headaches occurred and paralysis of the abcolour nesources occurred and paralysis of the su-ducers nerve developed all on the right side. At no users nerve ueveniped an on the right side. At 10 me of the other contigenography show any time did otogopy or roentgenography show and the other continues to show the same of the other continues to show th ture an occasiony or roentigenography snow any endence of changes in the right ear or other (mustoid evacues or changes in the right ear or other (mastold of periods) regions. There was some doubt at this time of any changes in the mastold cells of the left of the periods and show a some doubt at the left of the periods and show a some doubt at the left of the periods and show a some doubt at the periods are the periods and show a some doubt at the periods are the periods and show a some doubt at the periods are the period and the periods are the period and the period are the p time of any changes in the mustory country in the side and there was a slight mucoid discharge from nue and there was a sugar mucous discussive from the kit ear but nothing suggested the sudden change

Treatment with sulfaniamide combined with ireatment with suifaniamide combined with antipyogenic vaccine and vitamin B was instituted in the patient a condition saupyweene vaccine and vitamin n was instituted and a months later the patient was entirely well the

ere movements having become entirely well the An interesting coincidence was the sudden occur. an interesting contendence was the student occurrence of fever about to days before recovery with the discovery of plasmodium vivax in the blood

and one overty or passmootum vivax in the usous of Altogether, the patient had undergone anything plomies and received 15 ampoules of antipyogenic cities and received 15 ampoules of antipyogenic of the fill and the cities of t mlfanilamide.

NOSE AND SINUSES sportdium Soeberl Granutoma The First Case
In Turning Production Rhino-Center, D. D. Postl R. A., and Socel A. h Treumin (Primer caso en Treumin de gran in aucumum (rinner caso en aucumum de grand kona por rhinosporidium Seeberi) Arch farm bio-

The authors report a new case of granuloma prodeed by the rhinosportidium Secheri the seventh over my the ramosportalum seeden the seventh The reported in Argentina, and the first found in broman It shows a geographic sone so far un

known with regard to this parasite

This paragite is a fungus of the order of the chy tridles, belonging to the olpidiaceae family, necessary octonisms to the opiniscess is may a median of human infection as well as that of

interior of possible intermediary hosts is unknown. miscussin or possible intermediary nosis is missioned. The fungus produces a chronic inflammatory hypertrophy which results in polyps of the nasal mucosa. Photographic of missioned and acceptance in the original uopay watch results in polyps of the nass mucisse.
Photographs of microscopic sections in the original states when it also a sections in the section with the section of the sections of the s enotographs of microscopic sections in the original article show all the developmental phases of the

Peer L. A.: The Neglected Saptal Cartilage Graft the r l. A.i The Neglected Septal Cartiage oratic with Experimental Observations on Arch Carting Growth of Human Cartilage Grafts. Arch Older Cart parasite.

The general belief that autogenous aeptal cartilage guits do not survive after transplantation is error seems no not survive and transposausous estiliage, shoul, Autogenous sopial cartilage all survive after latest president and are more and arrevive after mount. Autogenous septal cartilage all survive after lateral cartilage, and rib cartilage all survive after the cartilage and survive after the cartilage and survive after the cartilage and th secret cartilage, and rib cartilage at survivo and transplantation as living cartilage. All may be used transplantation as living cartilage. Autogenous sepsectively for gratting purposes

tal cartilage is superior to alar and suricular cartilage unicarinage is superior to and animous commercial properties of the greater bulk and firmer structure. omy because of its greater ours and nines structure.

It is superior to rib cartilage because it is more than the superior to rib cartilage because it is more assumed to the superior of the readily obtainable Autogenous sopial cartilage should be used whenever a nasal defect can be anount be used vicinives a nassa defect can be adequately supported by the patient a septial cartillage with the addition of septial bone when necessary they are the nassal deposition to a septial bone when necessary they are the nassal deposition to a septial bone when necessary they are the nassal deposition to a septial bone when necessary they are the nassal deposition to a septial bone when necessary they are the nassal deposition to a septial bone when necessary they are the nassal deposition to the nassal dep

When the nasal depression is sufficiently large to When the masni depression is sumceruly large to require rib cardiage autogenous cardiage is the material of choice. Preserved cadevenic cardiage may be used in debilitated or elderly patients. may be used in debutated or ederly patients. Experimental observations indicated actual growth Experimental observations indicated across growing dyoung human annicular and appeal cartillage grafts. or young numan annicutar and septat cartuage graits increased the more bulky young rib cartilage graits increased the more unity young to carcuage graits increased in some cases and in others showed no increase in in some cases and in outers showed no increase in size. Septal bone gratis without periodteum translated beneath the abdominal skin retained their planted beneath the abdominal agin resained their normal bone structure for periods up to 4 years after normal pone structure for periods up to 4 years after transplantation. Rib and tibul bone, with and with out periosteom transplanted beneath the abdominal out permaterum cranspiantes seeneach the aconominat akin completely disappeared 7 months after trans

Berger M D : Neoplasms of Both Maxillary Sl plantation

THE Arch Order Chic 1945 42 397 Because of the apparent rarity of cases in which necause of the apparent rarriy of cases in which both maxillary anturns were invaded by neoplasms noun manuary anurums were invaded by neoplasms
a careful scrutiny of the literature was undertaken in a careru scrutiny of the interactive was undertaken in order to determine whether any such case had been order to determine whether any such case had been previously reported. During the past 20 years appropriately been no report of a case of bilateral neoplastic has been not report of a case of bilateral neoplastic. nas ocen no report of a case of pulsteral neoplastic involvement of the antrums. The author observed involvement or the antrums. The author observed cancerous involvement of the two maxillary antrums. cancerous involvement of the two maximary and units of age. The neoplasms were in a patient 62 years of age. in a parient or years of age.

In a neoplasms were separate and distinct entities. The second growth separate and distinct cutting in second growth developed while the patient was under observation.

Pharyngeal Diverticula. Bell J Surf

The author presents 21 cases of pharyngeal diver ticula treated by one stage resection and suture. Morley J Two cases of pharynges diverticula complicated

Two cases or pnaryngeal diverticula complicated by squamous epithelioms originating in the pouch are reconucd

Hurst's saterior pharyngoesophageal pouch is dem
onstrated with the aid of barrium in the vallecula

onstrated with the sid of barium in the vallecula between the tongue and the epiglottis.

The technique and results of the one stage excision

In e reconsider and results of the one stage excision operation are described and its advantages as comoperature are according two stages are set forth

Lesses, M F and Gargill, S. L.: Thioursell as a Common of Nontronenia and Accommissions of Nontronenia and Accommissions. Cause of Neutropenia and Agranulocytosia. N

The authors treated 62 patients with thiouracil.
Of these, 61 had thyrotoxicosis and I had angins

pectoria. Five patients developed neutropenia and granulopenia. Of these 1 (with thyrotoxicoth) died of agranulocytic angina another of the 3 patients developed a sore throat but recovered 1 patient, with granulopenia, recovered with continued admin intration of thiogracii.

Fifty four cases reported in the literature, and 5 personal cases of neutropenia following the administration of thiouracil, are classified in 5 groups, as fallows:

Group 1 includes 30 cases of asymptomatic neutropenia and granulopenia (often confused with the mild neutropenia and lymphocytosis of toric golter) group 3 includes 11 cases of significant neutropenia, frequently associated with symptoms, especially fever and pharyngits, which readily subsided on discontinuance of the drug the patients sometimes recovering with continuation of the drug group 3 includes 8 cases of severe granulopenia, many with a typical picture of agranulocytic angina, and 4 of which ended fatality

The authors discuss the relative benefits and dangers of thiouracil therapy as compared with the dangers of thiouracil therapy as compared with the dangers of thyrotoricosts and thyroid surgery. They point out that whereas most deaths following thy roldectomy are in patients with severely toxic solitors, thouracil may cause the death of patients

with mild thyrotoxicosis.

In analyzing the possible mechanisms of thiouracil neutropenis, the authors state that marrow biopsies indicate both destruction of mature granulocytes and inhibition of the development of premyelocytes.

Hypersensitivity appears to be the conditioning factor in the production of granulopenia with thoursell. Thioursell definitely falls into the group of drugs that produce allergic manifesta tons—namely drug fever uniterail and other types of with eruptions, and reproductions of toxic symptoms with readministration in small doese. Thyrotoxicosis seemed not to be a factor in agranulocytosis due to thiouracil since it occurs in the absence, and during remissions, of thyrotoxicosis. Dosage and duration of treatment also seemed to be not important.

Both semiltization and desensitization have been observed.

Patients who receive thiouracil must be under constant supervision. Since the coset of neutropenia and agranulocytosis is not detectable without blood counts, it is recommended that white cell counts be made three times weekly. The authors advocate the following treatment of agranulocytic angina smodated with thouracil withorwal of the drug, blood transfusions, and the administration of peniciffin, liver extract, penturolectivele, and yeast.

CLINTON H. THIRNES, M.D.

Lors, J. M.; Stripping of the Vocal Cords. Anii Otsler Chic., 1945, 42-378.

Experimental stripping of the vocal cords in cats established the fact of vocal cord regeneration. Application of this operation to the human larynx confirmed the experimental findings.

All types of benign lesions lend themselves to the stripping operation. Hyperkeratotic papilloms can be cured by this operation.

General anesthesia supplemented by local anethesia induced by the application of a solution of such anesthetic drugs as cocaine hydrochloride or tetracine hydrochloride is the anesthesia of choice. The operative technique has proved satisfactory. The postoperative management with silence or the whispered voice is questioned. Better end results have been obtained by permitting reasonable use of

the voice. Functional results have been good.

The satisfactory results obtained warrant the continued application of the principles of this operation.

NOAR D FAMECART, M.D.

# SURGERY OF THE NERVOUS SYSTEM

Tolnick, B., and Beck W C. The Haranine Tolnick, B., and Beck W C. The Haranine Transfer of Peripheral Nerre France in the Emination of Sections As an adjunct to other objective tests in the As an anjunct to other objective tests in the authors of permitted nerve belong the authors of permitted at the authors of the outreas of perspectal nerve (energy the surrors advocate and describe the histamine flare test. The serversite and describe the histamine have test. The test consists of an intradermal injection of o 5 c.c. of test consists of an intracernal injection of o ; c.c. of of the consists of the same of th \$1 to 1,000 solution of instamine phosphate in the affected extremity and as a control test on the unenected extremity and as a control test on the un affected side. The small red reaction at the site of enerted side. The small red reaction at the site of infection and the wheal which follows in the order infection and the wheal which follows have and its infection and the wheal which follows are and its infection and the wheal which follows have a support the size of t desposite importance. The nart comes inter and its intently and dimensions vary It depends on an intent stretolar circulation and on an interest account of the circulation and on the circulation account of the cir eneriols corculation and on an infact axing. Thus the presence of the flate will indicate rence. I have the presence of the last will minimate that both the local blood has been supply and the local blood has been supply and the local blood has been supply and the local blood will be a few months are a few months and a few months and a few months are a few months are a few months and a few months are a few months and a few months are a few months and a few months are a few months ar tings your inchocas nerve supply and the local phood apply are present, and the absence of a fact will be apply are present, and the absence of a share of the apply are present, and the absence of a share of the apply are present, and the absence of the apply are present, as the apply are present, as the apply are present, as the apply are present as the apply are present as the apply and the apply are present as the apply and the apply are present as the apply are present as the apply are present as the apply and the apply are present as the apply are present, and the apply are present as the apply are present, and the apply are present as the apply are present, and the apply are present as the apply are presen supply are present, and the absence of a hare will address that either the blood supply is absent or the imitatic tank etimer the 01000 supply is \$10000 of the first tank etimer the 01000 supply is \$10000 of the first tank etimer etimer tank etimer etimer

From their limited observations the authors sug erom their umited observations the authors and seal max in the autence of a liste the nerve is const.

Partly divided and requires early surgical regularity interpret the appearance of a partial flare as degeneration. incy interpret the appearance of a partial user as due to a concussion of edema of the nerve, for which due to a concussion of edema of the nerve, for which the concussion of edema of the nerve, for which the concussion of edema of the nerve, for which the concussion of edema of the nerve, for which the concussion of edema of the nerve, for which the nerve of the ner

one to a concussion of ciena of the nerve, for which recovery will be spontaneous without operative retvention.
The presence of the histamine flare being entirely and presence of the instanting first person furnished against on the degeneration of the agon furnished against a second state of the second state organization the degeneration of the arm turning organization of the degeneration of the arm turning the brokenization of the brokeniza and an objective test in the differentiation networks by the posterior and the organic anotherias. It was also have the control of the contro intervention use nysterical and the organic anesthesias 11 mby also be of value in the differential diagnosis of hysteria and mailingering. The injection of histantic is test and mailingering. The will almost always give painful and the mailineerer will almost always give tern and maningering. The injection of missings give

evidences of pain or of pruritus.

BRAIN AND ITS COVERINGS CRANIAL

Grunnagle, 1 F; Parly Treatment of Open Head Wounds. Wor Mrs. Chic, 1945 8 370

The author's article deals with his experience in the author's article deals with his experience at the treatment of open head wounds in a principle bonnies during a reserved of a months in the Dilling one treatment of open head wounds in a general hospital during a period of 7 months in the philip-baptist during a period of 7 months in the catterns, and carries are carressions. washirst during a period of ? months in the patients of the patients of cent of the patients suffer disections of various types, and the mortal literature in one months.

The objectives in the treatment of craniccerebral the objectives in the treatment of craniccerebral three objectives are the consequent to the consequence of the con the objectives in the treatment of crandocreusal informs are the preservation of life the preservation of timeston. The different control of timeston and timeston and timeston and timeston and timeston. uppress are the preservation of the the preserva-of function and the prevention of infection and the prevention of infection and the prevention of the threat the same of the prevention of the preservation of t or runction and the prevention of infection of the elimination of infection will do much toward and eccompliant of the two other objectives and recompliant of the two other objectives and the objectives are the contract of the two other objectives and the other objectives are the contract of the other objectives and the other objectives are the objective objectives are the other objectives are the other objectives are the other objectives are the other objectives are the objective objective objectives are the objective objective objectives are the objective ob ity was I per cent. accomplishment of the two other objectives and the prevention will depend almost entirely upon the application of sound first six measures and the east. victorium will depend aimost entirely upon the application of sound first aid measures and the early definition annual arms.

deputitive surgical tebests

The first aid measures include, mainly the treat ment of shock and the loss of blood, drainings of a ment of shock and the loss of blood, drainage of a distended urthary bladder, the institution of systemic sulformatic and penicillin therapy shaving and sulformation of the seals the archiveston of a large step of the seals the archiveston of a large step of the seals the archiveston of a large step of the seals the archiveston of a large step of the seals the sea suitonamice and penicillin therapy shaving and cleaning of the scalp the application of a large stering decreasing of the scalp the scale of a second state of the scale of th cleaning of the scalp the application of a large ster toxoid, its dressing the administration of tetania toxoid, and dressing the administration of tetania toxoid. ue arresung the samulatration of telanus toxoidand prompt evacuation of the patient to a hospital equipped for definitive surgical intervention on such

ounds. The optimum time for débruiement is within the The optimum time for deormement is within the first of hours following injury but it can be done site. wounds

nist o nours following mutry Dut it can be done sites a longer interval has clapsed if adequate penicillin a longer interval has elapsed if adequate peniculin and sulfonsmide therapy have been instituted. The and sulforamide therapy have been instituted. The sulfor strongly advocates early and complete of the sulfor strongly advocates carly and closure of the sulforment of all involved trauces, and closure of problement of all involved trauces, and closure of the wound without dralages as the best means the scale of the sulforation. All nations to whom the scale of the sulforation of the sulforation of the sulforation of the sulforation of the sulforation. wound without drainage as the best means of pre-venting infection. All patients in whom the scale wenting infection All petropes and a sufformation had been debrided and left open and a sufformation had been debrided and jett open and a solionamide dressing had been applied arrived in the rear area dressing had been applied arrived in the rear area with verying degrees of infection and aloud closed with verying which had been debrided and closed action when a section were infected and come of the company of the scalp wounds which had been debrided and closed, with drainage on the other hand all wounds which holder down of the splice dow

broken down On the other hand all wounds which had been debrided and closed tightly without drain bad been debrided with no evidence of infection, which age had bested with no evidence of the server of the method of tree trees. age nau neased win no evidence as injection, which proved the efficacy of that method of treatment. The proved the emercy of that method of treatment. Inc. author believes that the same principles should be applied in the treatment of fractures of the skull. He applied in the treatment of fractures of the skull. He emphasizes the importance of the removal of all emphasizes the importance of the removal of all foreign material, fragments and contaminated bones of the contaminated bones. reign material, fragments and contaminated sone Cases in which the dura had been torn showed

Severe and extensive damage as the result of infections and extensive damage as the result of infections are also as the result of infections are also as the result of infections are also as the result of the res severe and extensive damage as the result of infect tion. Such complications consisted of infectes in the complications of the skull and cellulina-terebral herniations menting its of the skull and cellulina-addition to extensive infection commend in maximum Nations hermiation per infection commend in maximum. addition to esteomychis of the skill and cellulities.
Neither herolation not infection occurred in patients Neither herniation nor injection occurred in patients in whom early and adequate debridement such states that, in whom early and adequate The author states that, are had been accomplished. sure had been accomplished. The author states that, it necessary closure of the dura can be obtained by it necessary are to see the state of the sta it necessary closure of the dura can be obtained by the use of a graft taken from the sheath of the term the use of a grait taken from the sheath of the temperature of muscle, perfecteum, or fascia lata. The same poral muscle, perfecteum, or fascia lata. The same observations were made following the treatment of observations expenses are extensive expenses and a second of the same of observations were made following the treatment of more extensive cerebral lacerations. The removal of the remov

ciots, and debris by careful irrigation and suction is recommended. So of primary importance bral hemiston bral hemiston to the near and the near an bral herniaton is of primary importance
Fractures extending into the nose and the except
accessory sinuses, and basiles fractures with escape
of extensional fluid (without associated lacers
there) were treated conserves treate

thons) were treated conservatively

Increased intracranal presente was treated by

Increased intracranal limitation of fluid intake, the

levation of the head limitation of your constitutions of the head limitation of the head limitati or concentrations name factorized elevation of the near limits on of min interes, the intravenous administration of 10 per cent destroys

intravenous administration or 10 per cent destrose in distilled water and magnesium sulfate retention in distilled water and magnesium sulfate retention. enemas.

The author believes that penicillin and sulfona miles should be given to all patients with severe miles should be given to all patients.

craniocerebral injuries, but that the use of these cannocereuse mjuries, out that the use of the drugs does not replace proper and early surgical debridement and repair. Drains offer a pathway for the entrance of infection and should therefore be avoided Tight closure of the débrided wound is the

GEORGE PERRIT. M.D.

Wycia, H.1 Bilateral Intracrantal Section of the Clossopharyngesi Nerret Report of a Case. Arch Near Psychiat Chic. 1945, 54 344.

This brief article gives a concise review of the surgery on the glossopharyngeal nerve and a resumé of the effects of the glossopharyngesi nerve on the

A case report is given of a patient who was oper ated upon with bilateral section of the glossopharyngeal nerve for the pain of carcinoma of the epigest news to the period the nerves a dramatic rise in pharpus. On section of the nerves a dramatic rise in blood pressure, palse and replicatory rate was noted, whereas previous to operation these figures had been at a normal low level, the carotid sinus had not been sensitive to manipulation, and the electrocardiogram was normal. The pulse and respiratory rate remained high for 3 days, and the hypertension per stated for 4 weeks not reaching the preoperative levels until 5 days prior to the death of the patient, when there were signs of circulatory failure. The patient died of suppurative pocumonitis I month after operation due, not to inability to awallow became of the section of the glossopharyngeal nerves ance at all inceposition of the patient suffered no dysphagia, but rather to a constantly aloughing epipharyngcal mass which discharged continuously into the lower pharynx. In and of itself bilateral section of the glossopharyngesi nerve is compatible

Woolf J I : Acute Hypertension with Sodium Pentotial Anesthesis in Neurologic Surgery

Acute arterial hypertension which occurs during the subtemporal approach to the gamerian ganglion has been reported when sodium penthothal ancetheme is used. This rise in blood pressure is well defined and in o consecutive cases averaged

A similar rise in blood pressure did not occur when other anesthesis was used

Further studies were conducted upon patients operated upon for hernlated intervertebral disca under sodium pentothal anesthesia. No elevation of the blood pressure could be demonstrated.

It was also noted that the final blood pressure was higher in both the dislocated intervertebral disc series as well as the gamerian ganglion series when they were operated upon under sodium pentothal anesthesis. It was therefore suggested that post operative shock was less likely to occur under such

It is not possible to give an entirely satisfactory explanation ( the acute hypertension noted ex

clusively in the patients operated upon for section of the sensory root of the gamerian ganglion. It is suggested that there may be a hypersensitivity of the suggested that the control of the superior cerebral vasomotor centers under pentothal anesthesia. Retraction of the temporal lobe may result in widespread pressure or irritative effects although the site of vasomotor atimulation is not known.

No untoward effects were noted as the result of this temporary hypertension during surgery

HOWARD A. BROWN M.D.

# SPINAL CORD AND ITS COVERINGS

Shenkin, H. A., Horn, R. C., Jr., and Grant F C. Lesions of the Spinel Epidural Space Producing Louisms of the option Chautiest opened formation.

And Suff 1945, 511125.

The authors review the spinal extradural compresave lesions encountered in a 10 year period (1931-1944) in the material of the Laboratory of Neurosurgical Pathology of the Hospital of the University of Pennsylvania. These formed a series of 54 cases and comprised roughly 3 per cent of the total and comprised roughly 3 per cent of the total number of mass leasons of the spinal canal. The lesions are classified pathologically and described

Metastatic carcinoma was proved in 9 cases. Of these, 5 patients were over 50 years of age, and 1 (a man with a probable primary kidney tumor) was 37 years of age. Symptoms of root compression appeared first, followed usually after a period of several months, by cord compression. Progression was rapid and the systemic nature of the process was anguated by weight loss. Roentgenograms showed vertebral crosion. In 6 of the 9 cases the primary site of the lesion was never determined. In addition to the kidney tumor primary carcinoma of the lung was discovered in a cases. Decompression gave re lief of pain but falled to relieve the symptoms of cord compression.

All of the tumors were frisble and encircled the dura. The laminac and spines were extensively involved. Five of the lexions were adenocarcinomas, s were aquamous cell epitheliomas, and s were up-

In 7 patients in the fifth to seventh decades of Re myedomas were found. All patients had symptoms of a sudden onset of cord compression. Roentgenograms showed vertebral erosion and complete spinal subarachnold block. In one-half of the cases there were symptoms of premonitory root irritation. Complete studies were made in 4 of the cases and in only I case was the vertebral lesion shown to be an isolated one. There were no alterations in serum proteon and the presence of Bence Jones protein in the urine was not observed in the 3 cases in which these examinations

The epidural mass found at operation was extremely vascular The tumors were composed of closely packed masses of cells resembling plasma cells. As a group, the patients succumbed rapidly the longest survival being 14 months

Six cases of neuroblastoma (sympathicoblastoms) were found. Three of the patients were between 9

SURGERY OF THE NERVOUS SYSTEM

and 13 years of age, and the remaining 5 were 6 and 13 years of age and the remaining 5 were 6 months, 23 years and 67 years of age. The two older patrols had had pain for a period of 6 months prior patrols had had pain for a period of 6 months prior patrols had been partially the diversion of costs in the patients had had pain for a period of 0 months prior to cord compression the duration of pain in the to cord compression the duration of psin in the other 4 patients had been less than 1 month. Roent second of vertebral involvement was second of vertebral involvement was second of the control of vertebral involvement. genological evidence of vertebral involvement was soled in a cased a retropersonneal mass was present noted in a cases a retrojectioneal mass was present in 4 cases and a posterior mediatinal tumor in a and a posterior mediatinal rumor in 5 The tumors appeared blubh red and very case. The tumors appeared blutch red and very rescular and tended to infiltrate into the paraver vascular and tended to innitrate into the peraver tebral number. The majority of the tumors were tebral numbers. posted in the lower dozen and upper lumber regions.

located in the lower dorsal and upper jumpar regions.
The six-months-old infant is living 1 year after The sirmonius-oin infant is living 1 year after operation, and has shown some neurological improveoperation, and has shown some neurological unprove-ment the other 5 patients are dead The histological appearance of the tumors was The histological appearance of the tumors was that of said cord or small nests of tumor cells seen that of said cord or small nests or small nests of said cord or small nests of said cord or small nests o

that of solid cord of small nests of tumor cells seeps and rated by delicate fibrous bands. The cells were small mark or small marks are small marks. rated by delicate ubrous names. The nuclei were small with scarty cytoplasms. The nuclei were stands ord and hyperchromatic. Silver stains showed ores and hyperenromatic. Silver stains showed believe relevain firms. Some of the tumors showed interest relevants annealed an altimate of the tumors of tumors. selectic reticulin tubris. Some of the tumors snowed that the containing clumps of charge rells with nuclei containing clumps of charge reliable with nuclei containing clumps of charge reliable reticuling tumors and the containing clumps of charge reliable reticuling tumors and the containing clumps of charge reliable reticuling tumors and the containing clumps of charge reliable reticuling tumors and the containing clumps of charge reliable reticuling tumors and the containing clumps of charge reliable reticuling tumors and the containing clumps of charge reliable reticuling tumors and the containing clumps of charge reliable reticuling tumors and the containing clumps of charge reliable reticuling tumors and the containing clumps of charge reliable reticuling tumors and charge reticulin safer cens with nuclei containing cumps of coro-main. These were thought to be sympathoblasts as described by Rit and Ceschickter. In 1 case the as described by Max and described in the other many have been primary in bone in the other many have been primary in some indicate and a second secon

umor may have been primary in bone in the other cases it beemed to have invaded the epidural space from the retroperitoneal space or the posterior

Louissumum.

In a patients, piant cell tumor of the bone occurred in 3 patients, grant cell tumor or the none occulred tums the second decade of life. All 3 had root tritle. mediastumm. of several months by the abrupt onset of cord comresson with rapid progression of symptomentes.

Exicus were in the midthoracter region, was no bixtory
opposed showed bony erosion. There was no bixtory
opposed showed bony erosion.

At operation the authors found an enof traums. At operation, the authors found an enograms showed bony erosion the suthers found an en-

or traums. At operation the authors found an eith capaniated tumor mass usually not connected with bone. All 5 Detlents are well after surgical cureitage. one. All 3 patients are well after surgical cureras and postoperative irradiation after 2 3 % and 9 depends on the first state of the tumors were composed of year enjagement of the same type as those seen in the cells were of the same type as those of 3 of 1 the cell tumors of the bone. The sections of 3 of the land of the land of the cell tumors of the bone. want cell rumors of the bone. The securing of a the basins showed extensive new bone formation.

or returns showed extensive new bone formation. In the group of miscellaneous epidural tumore, the group of miscellaneous epidural tumore, in the group of miscellaneous epidural tumore, in the group of miscellaneous epidural tumore, in the group of the in the group of miscellaneous epidural current for the group of lymphotarcona occurring in the current group of th mino were 2 cases of lymphosarcoma occurring in patients 35 and 21 years of age, each of whom has not involvement and cord compression as their first most involvement and cord compression. root involvement and cord compression as men lines and bloods are also an analysis and an area of the same and a same a same and a same and a same a symptom. In both cases the gross and historic experiences of the tumors were characteristic 

een and 10 months effer operation, to however by introduced intensive irradiation, both patients are in good general condition and able to get about with the aid of cares. One case of lipoms in a 45 year old patient, and I old processes of lipoms in a 45 year old patient are reported of liposarroms in a 45 year old patient are reported. In the forecast of the case of or uposarcome in \$ 43 year old patient are reported. In the former there was a slowly progressive parameters from the former there was a slowly progressive former there was a slowly progressive former.

in the former there was a slowly progressive paraparceis with no symptoms or signs of root involved by ment, and surgical decompression was followed by complete recovery in the latter parapletis which most was followed by complete parapletis, and beety most was followed by complete parapletis, and beety most was followed by at operation a red beety developed in sa hours. mouth was followed by complete parapiegia which developed in 34 hours At operation a red beety

mass involving the eighth thoracic vertebra was found. The patient was unimproved by operation found. The patient was unimproved more according to the property of the propert and. The patient was unimproved by operation An encapsulated hemangionia caused progressive An encapsulated hemangioms caused progressive WERENCES IN \$ 54 year old woman. This was completely removed and the patient made a full recovery plately removed and the patient made a full recovery
Another blood vessed tumor a malignant, hemengo-Another blood versel tumor a malignant hemangio-perfeytoma", metastasted to the fill symptoms from the thigh in a 43 year old man and death corntred were not relieved by coveration and death corntred from the thich in a 43 year old man this symptoms were not relieved by operation and death occurred

iter a period of 5 months.

In a case of acute monocytic feucemia in an 18 In a case of acute monocytic foucemia in an its year old girl leucemic infiltration caused root pain and monocytic foucemarks. Should not provide the control of the control of the case o after a period of 5 months.

year old gun leucemic inhitration caused root pain and rapidly progressive quadriplema. Death oc nired on the ninth day after operation
One completely extradural neurilemnoms was and rapidly progressive quadriplegia. curred on the ulnth day after operation One completely extracural neuriemmons was found in a 52 year old woman root pain for a period toms of cord compression and root pain for a period

toms or cord compression and root pain for a period of 7 months. At operation the tumor was only for the condition of 7 months. of 7 months. At operation the tumor was only partially removed and the patient had relief for partially removed. partially removed and the patient had relies for several months however, there was a recurrence of the tumor and the patient finally succumbed to the tumor and the patient finally succumbed to

Data.
There were a unclassified tumors one of which

I nere were a unclassing numors one of which closely resembled a hemengloms, the other a making nant neurisemmona.
In 2 of the patients in this series spins extradural
These were characterized by
These were present.
These were characterized by

cysts were present. These were characterized by spatial paraparetis, and loss of position and aboved a done sense in the legs. Romingenograms showed a tension service of the pedicles. Following operative removal of the cysts both patients made complete removal of the cysts.

Chronic epidural hamatoma canased cord compres-Chronic epidural nematoma caused coru comprisrecoveries

sion in 2 panents. Neither of these patients had any history of traums, and the onset of symptoms was the ballony of traums, and the onset of symptoms. nistory of traums, and the onset of symptoms was yery sudden. At operation the lesions appeared yery sudden. At operation of an intra-mental anhancement of the contral of very sudden. At operation the lesions appeared similar to those of an intracrantal subdural home similar to those of an intracranial subdural hems following decompression the other platest toms. Following the condition of the other platest completely well the condition of action platest was not was a case of acute related to the condition of action was not become the condition of the condi

was unimproved There was a case of acute epidural hemorphage following trauma. This patient was not hemorphage following trauma. mented by operation.
There were 6 cases of a cute epidural abscess. The There were 0 cases at some spinites assects. The ounce of symptoms was endden and the progression of the control of symptoms was ended as the control of the onset of symptoms was sudden and the progression. The source of the infection and residue in all cases. The source of the infection are residued in all cases. penetited by operation

rapid in all cases. The source of the infection and the organism (hemolytic staphylococcus albus) were the organism (hemolytic staphylococcus albus) were very extention of the organism (hemolytic staphylococcus albus). easily determined the aircraft were very exten aircraft and only I better was benefited by operation. sive and only I patient was benefited by operation.
Two patients with tuberculous granuloms were
repeated upon In each of these the indications since
operated upon in each of these the indication since
operation were symptoms of cord compression in
other charge was not conventionally after concentration. casily determined operation were symptoms of cord compression since tubercuteds was not proved until after operation. A decrease of tubercuteds were supported to the control of tubercuteds the control of tubercuteds. fuberculosis was not proved until after operation. A diagnosis of tuberculosis usually contralidicates

laminectomy

Three cases of syphilitic number of the coldural
Three cases of syphilitic numbers of the coldural
space were observed. The Wassermann reaction of
space were observed. The hard of all restions were
hords the suited fluid and the blood of all restions. laminectomy

space were observed. The Wassermann reaction of both the spind fould the blood of all patients was both the spind fould for root pain and over compression for the spinding of spinding of

The authors senes also includes a cases of nonspecific granuloms. The symptoms were slowly progressive in all of the patients. Only 1 of the 3 was benefited by operation. ROBERT E. GREEN, M.D.

# MISCELLANEOUS

Walker A. E., and Johnson, H. C.: Principles and Practice of Penicillin Therapy in Diseases of the Nervous System. Ass. Surg 1945, 2 1115

Although systemic penicillin appears in the spinal fluid in only minute quantities when injected into a normal animal or person, the amounts are materially increased and will be sufficient to cause bacteriostasis for the more sensitive organisms when meningeal irritation, caused either by sterile media (such as air in pneumoencephalography) or by bacterial in-

vasion, is present. In intrathecal administration of the drug, the best diffusion and the highest levels are found in intraventricular injection. Injection into the cisterna magna gives the next best results and injection into the lumbar subarachnoid space the poorest. Both of the former routes are too dangerous for any but

very extraordinary cases.

Intrathecal penicillin can produce toxic effects on the nervous system. Twenty thousand units in 1 c.c. of saline injected into an experimental mankey produces transient perianal paresthesias, and in some cases convulsions come, and death. A patient who was given 100,000 units of penicillin in 5 c.c. of saline developed urinary retention, saddle paresthesias, and paraparesis. It required 3 months for these symptoms to clear up Neymann has re

ported 2 cases of convulsions, come, and death when 50 000 units of penicillin were injected into the chterna magna of patients with dementia paralytica. Convulsive manifestations are more likely to follow intraventricular injection of the drug, or its topical application to the cerebral cortex.

In the treatment of specific disease, penicillin should not be used for meningococcus meningitis unless sulfadiazine fails to yield improvement in from 24 to 48 hours. In this disease, intramuscular penicillin (40,000 units every a hours) should be used.

For streptococcal meningitis, intrathecal as well as systemic injection is required. This is also the case for staphylococcal menineitis. In the treatment of pneumococcal menbrits, a

disease that was uniformly fatal before the advent of chemotherapy sulfaduzine plus both systemic and intrathecal penicillin should be used.

In the surgical treatment of compound fractures of the skull, from 5,000 to 20,000 units of either dry or aqueous penicillin may be placed in the wound in addition, systemic penkellin should be given. Before a brain abscess is drained, systemic peni-

cillm (200,000 to 300 000 units) should be given daily At the time of drainage 1,000 to 20,000 units may be instilled into the cavity

Infected meningoceles and meningomyeloceles re

spond well to penicillin therapy
Penicillin has a favorable effect on early neurosyphilis, but tuberculous meningitis, brain tumor, multiple sclerosis, amyotrophic lateral scierosis, and cerebral degeneration are unimproved by the drug ROBERT E. GREEK, M.D.

# SURGERY OF THE THORAX

# CHEST WALL AND BREAST

Govan A. D. T : Two Cases of Mixed Malianant Tumor of the Bresst J Palk. Beck., Lond., 1945,

The following 2 cases of mixed malignant tumor of the breast were reported not only because of the parity of these growths but also because the histological diagnosis appears to be unusually precise and the similarity of the case histories and subsequent development makes them of clinical interest

The patients were admitted to the Queen Elizabeth Hospital, Birmingham England Their ages were 37 nospital, uirmingham England Their ages were 37 and 47 respectively They both complained of a progressive swelling of the breast which developed a discharge from the mpple Examination revealed an enlarged nodular (cyatic) breast which was mobile No other pathological conditions were ellcited

One patient was treated by excision of the breast followed by deep x ray therapy The other was reacted by a mastectomy followed by x ray therapy Both patients made an uneventful postoperative recovery and were discharged to the x ray clinic They were readmitted to the hospital shortly after their discharge, the first patient complaining of a lump in the axilla and the second of a lump in the incison. The patients received further surgical and I ray therapy Death occurred a few months later Secondary metastases to the lungs and spine were

Laboratory examination revealed the growth to be well circumscribed and in parts almost encapfound. sulated It could be divided roughly into cystic and noncy it come be division longing in a pregular noncythe parts which gave the tumor an irregular lobulated appearance. The cyals were irregular and benorthagic They might well have been formed by necrosis of and hemorrhage into parts of the tumor The neoplastic tissue consisted of solid white fleshy masses bearing little resemblance to the usual carci nomatous growths of this region There was no suggestion of irregular or widespread infiltration of the normal tissue such as one finds in carcinoma. At all points the growth was clearly demarcated from

It was at once evident on microscopic examination the normal breast tissue that two types of growth carcinomatous and sarcomatous were present. The carcinoma could be seen to have originated in the main ducts. It was shorn to from the thrue surrounding the hemorrhagic cyst and the tissue surrounding the removable periphery Here and there smaller and more irregular islands of archioma could be seen in the central portun but stemona could be seen in the central potton for the start with the seen in the central potton for the start with the seen in the central potton for the seen in the seen in

It must remain in doubt whether the sarcoms or the second type of growth the carrinoma was the cause of the metastases which west undoubtedly present. There was however, no evidence of lymphatic permeation and the subse-

quent history is one of early local recurrence with later metastases to the lungs and bones via the blood stream These facts would suggest that it was the stream these facts would suggest that it was the sarcoma which had disseminated, and indeed it would seem unlikely that a well differentiated carciwould seem unitary that a went uncerentated carri-noma with relatively few mitoses, would produce blood borne metastases in such a short time.

The sarcoma cells were derived from the muscle the majority of cells were spindles Numerous giant

ceus also were present.
In general the growths were not vascular and little stroma could be demonstrated by ordinary methods but silver impregnation revealed an abun dant reticulum which closely invested the individual cells of the sarcomatous portion.

# TRACHEA, LUNGS, AND PLEURA

Blackburn G., and D Abreu A. L.: Thoracoab-dominal Wounds in War Bril J Sarg 1945 33

The authors analyze 126 cases of thoracoabdomi nel wounds treated at forward operating centers nai would accept a totward operating centers and 74 cases treated in the surgical division of a base and 74 cases treated in the surgical division of a base bospital of the 126 patients treated at forward poperating centers 46 (36.5%) died of the 74 ps operating who reached the base hospital, only 3 died

The distinction between thoracoabdominal wounds and abdominothoracic wounds is important. The and auditinuous and rounds is important. The great majority of wounds belong to the first group the wound of entry is in the chest, and the foreign body or the wound of exit is below the disphragm The thoracoabdominal wounds respond more fa The thoraconnounting would type, and are less vorably than those of the opposite type, and are less vulning that the opposite types and all costs likely to require laparotomy Wounds of the right arde tend especially to belong in this category and ame tenu capaziony a source in the caregory and if the liver is the sole abdominal viscus that is in jured a laparotomy need not and should not be undertaken. Only 8 of 65 right sided wounds had an unuersacii. Omy od vy seus lesson while 30 of 61 left sided wounds had hollow viscus lesions, with a cor respondingly steater mortality among the patients with left-sided wounds. The authors believe that laparotomy should be avoided if possible If how ever a laperotomy is necessary a Kocher's incision ever a inpartition is increased a five in increased will give excellent access. The type of thoracic oper will give excellent access. ation also is subject to variation most British sur geons being content with rib resection and closure group orming the diaphragm of the diaphragm

Nonoperative treatment of thoraconodominal in Juries has a place, especially for wounds on the right name was a place expension to mounts on the right and, but certainty of diagnosis is difficult without radiography A wound may be labelled thoracoabradingraphy A would may be labeled (oursecondwound in the chest, can be demonstrated below the diaphragm (2) hematuria is combined with hemodispursion (2) nematical a communed with near-thorax or hemopheumothorax (3) the presence of a

# picurobiliary fistula is proved by thoracic paracente

Although the mortality rate in those patients who aurive the initial wounding and operative treat ment is low the morbidity rate is high.

The complications in the series of 74 cases were as follows

Hemothorax, 18 cases atelectash, 15 cases subphrenic abscess 12 cases (6 with coincident em pyrma, cemprema ii cases emprema with pleuro-biliary fistula 7 cases lung abscess, 2 cases and

The management of hemotherax is no different from that in a simple thoracle wound Ro-expansion of atelectatic lobes after postural drainage and or acceptant area area produced or annual or annual area breathing exercises is the rule and a course of sulfa diarino is often of value in reducing pyreria where progress is slow Both lung abscesses recorded in the table resolved without operation, but were treated with a course of parenteral penicillin.

The most significant complication is empyeme. All cases of empyems are not due to infection of a hemothorar, aince a considerable number follow lower lobe collapses associated with across effusions that become purulent. It is essential, therefore, to watch for signs of effusion constantly and to perform paracentesis thoracis if clinical or radiological signs develop The diagnosis of picurobilitary fistula is casily made by examination of fluid obtained by aspiration from the pleural cavity Drainage should be instituted early, as loculation is likely if drainage h delayed. Significant diagnostic features of sub phrenic abscess were hertic fever with its constitutional malaire, high leucocytosis local tenderness and swelling, restricted rib movements, a disphragm invisible radiologically with a finid level beneath it and an overlying sympathetic pleural effusion. Disphragmatic hernia is uncommon as a sequel of

The canative missile is rarely seen during opera tion for thoracoabdominal injuries but should be removed if easily accessible. In cases with retained foreign bodies, the liver is a common site, but the fate of retained missiles in the liver is difficult to ascertain. It may be wishful thinking to suggest that they do not often came mischief. A case of fatal abacess occurring in the liver after removal of a

# JOHN L. LINDQUINT, M.D.

# ESOPHAGUS AND MEDIASTINUM Nielsen, J.: Clinical Results with Rotation Therapy in Cancer of the Ecophagus. Acts rates,

Rotation therapy offers some fresh possibilities in dealing with cancer of the coophagus which has hitherto proved little amenable to curative treat ment. The author's report is based on results obtained with the rotation method of treatment in the past 3 years. The clinical development of carcinoma of the esophagus (the most malignant and most

rapidly lethal form and alto of epithelial cancer) has hitherto been so quickly fatal that it is permissible aiready after a relatively short period of observa tion, to draw certain conclusions with regard to the therapeutic effect.

Experimental studies and measurements on phantoms revealed that the most favorable degree of effect is obtained when the focus akin and the half layer values are as great as possible and when the size of the field and the object, and the density of the latter are as small as possible. With the me of 180 kilovolts o 5 mm. of copper and 15 milliampers. the intensity measured in air is 65 r/min at a ditance of 40 cm., and 42 r/min. at a distance of 50 cm.

Each sitting can thus be given in a reasonably short period of time (10 to 15 minutes) The material was comprised wholly of referred cases. No case was refused, not even at the pre-

liminary examination. A considerable proportion of the patients were severely affected and much midebled a number of them with marked cacheria, and with metastases to the lymph nodes in the neck, to

One hundred and ninety-four patients were treated by tradiation. Of these, 174 (00%) were given rotation therapy Eight patients (4%) were as feeble upon admission that no treatment could be given. Twelve patients (6%) in whom the cancer was situated in the cervical part of the esophages (most of these were women), or at the level of the lagulum (a not uncommon site in men) were siren crossive irradiation to multiple fixed fields but the author believes that the rotatory treatment will aways have the advantage, essentially over cross-fire irradiation through fixed fields by increasing the depth doe rendering the focal does hemogeneous, and eliminating the risk of over-crossing effects.

The screening control requires that the patient shall be scated on a stool which during irradiation rotates about a vertical axis, while the roemigen tabe is fixed in a position with the central ray directed hocizontally Only alight cutaneous reactions were observed, and in spite of large daily and total doses, there were no general reactions except moderate leucopenia nor were there any other unpleasant after symptoms. The total dose, which is reached in the course of from 5 to 6 weeks (sometimes 7 to 8 weeks and a minimum of 3 weeks) is about 5,000 rounteens

The rountgenological diagnosis of tumor in all the cases was verified by microscopy in 113 (60%) Squamocellular carcinomas of the caophagus, which constitute the majority of the carcinomas in that site, are not as highly differentiated as for instance. carcinomas of the tongue and oral cavity and would indicate a correspondingly greater radiosensitivity There is therefore reason to contest the not uncommon belief that nearly all carcinomes of the coople gus are, histologically of a strongly keratiniting aquamoccliniar type, and consequently radioresistant. When the question is of squamocellular carefnomas, which on account of their comparatively slight

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adosensitivity require a considerable amount of dily radiation, the reaction of the tumor will be all the greater the shorter the full treatment time can the greater the another words the higher single and daily pemane in other words the manner single and daily does can be given. If the treatment is extended ones can be given if the treatment is extended over too long a period there is time for the development of connective these reactions with the result hat not all the cancer cells become destroyed

In 117 cases (four fifths of those fully treated and two-thirds of the total number) complete or pearly complete primary freedom from symptoms was obtained that is almost normal deglutition and roentgenologically marked improvement of the pas numerous market improvement of the deglutition was of shorter or longer duration Recurrences in the cophagm were not infrequent they often occurred above or below the primary stenosis and were then accessible to another palliative irradiation. In many cases the patient was able to swallow right up to the time of death which in most cases was due to metaslases or cacheria. The results so far show an indubi table improvement of the survival curve

# MISCELLANEOUS

Wood, H., and Sweetser H B. Jr : Punctate Cerebral Hemorrhago following Thoracic Trauma U S Nos M Ball., 1946 46 51

On the authors hospital ship a fatalities were excontered from symmetrical diffuse, punctate cerebral hemorrhage secondary to severe thoracite than and multiple fractures. The first case carried to demonstrate of assemblands block concussion the a diagnosis of atmospheric blast concussion the second resulted from a fall. Hastological study of the 2 case revealed hardly any cerebral fat embolism as

a basis for the punctate hemorrhages The first patient, injured by an atmospheric blast had an extensive right thoracic and abdominal conmake, right hemothers, puncture of the right hang one fractured right rib a fracture of the right mmerus and right acetabulum rupture of the splera and liver hematoms of the right adrenal pland, renal bleeding mediastinal hemorrhage, and the benorrhages into the scrous membranes of the theoretic and absoluted modulars.

The second patient was injured by a fall from a thoracic and abdominal cavities beight of 25 feet, which resulted in an extensive

right thoracic contusion fracture of 6 right ribe, right hemothorax and atelectasts (with terminal acute lobular pneumonia) puncture of the right diaphragm and the liver, and hemorrhages into the unaphragm and the aver, and nemorinage into the serous membranes of the pleural and abdominal cavitics. Each case was characterized clinically by progressive come with no localizing neurological

Both patients showed pulmonary fat embolism The first case in which there was fracture of the long bones was much more extensive than the second SLETE A fat embolus was demonstrated in a capillary of the cerebral white matter in the patient cited in case r but it was not associated with hemorrhage No fat embolism was demonstrated in the cerebral

The hypothesis is presented that the force of the white matter of the patient in case 2 traums to the thorax of these potients was transmitted to the venous circulation and resulted in a retrograde wave of elevated venous pressure. The degree of force involved in these cases was sufficient to overcome the barrier of the one set of venous valves located near the termination of each internal jugular vein. From that level to the capillaries of the brain there are two direct, relatively short columns of blood which are unprotected by venous valves.

The most abrupt change in vessel caliber is from the capillaries of the cerebral white matter and the basal nuclei to the great cerebral vein. The venous tract from the capillaries of the cerebral white matter bassl nuclei and upper midbrain to the confluence of the dural sinuses is more direct, and is generally shorter than the tract from the capillanes of the cerebral cortex to the confluence of the sinuses The angles at which the superior cerebral veins enter the superior sagittal sinus and the venus cures the suprant same and the presence of the folds of dura in relation to the ostia of these veins would tend to lend protection to the capillaries of the cortex from a retrograde wave of

In brief a retrograde wave of venous pressure should strike the capillaries and venules of the pressure. cerebral white matter before it strikes those of the cerebral cortex. The force should be less readily dispersed in the white matter than in the cortex. This hypothesis should be subjected to experimental study

# SURGERY OF THE ABDOMEN

# ABDOMINAL WALL AND PERITOREUM

Chandy, J.: The Use of Heterogenous Fascial Grafts in the Radical Operation for Remiss.

The author apparently prepares his own deep fascia of an ox or cow and uses white cotton No 40 for sewing the flap of fascia to protect the floor of the

The preserved or fascia, which measures about a by 1 5 luches is dried of alcohol between gauge and placed on the area. One long border of the and practice on the area. One song country or the interrupted sutures. The lower corner is sutured to Cooper's ligament and the inferior border is fastened to the periosteum of the pubic bone taking care to include a good part of the periosteum. A salit about one half inch in length is made on the upper border of the graft, and the cord is passed through this opening. A suture is passed through the fair inguinals while the muscle is being lifted by a retractor, continued through both corners of the slit ends of the graft, carried back through the muscle and tied. The fascial graft is thus anchored under the fair inguinalis with allowance for passage of the cord. Two sutures are used to anchor the fasca under the conjoined tendon, and a to secure the fascia under the rectus sheath on the medial side Sometimes it may be necessary to sin a part of the rectus sheath to insert the fascial graft under that muscle. Now the fascia is well anchored to Poupart a ligament the public tubercle and under and to the fair inguinals and rectos sheath, the cord passing through a narrow slit in the fascia

The cut edges of the external oblique aponeurous are next autured and the wound is closed by inter

The work of Hass on the use of preserved or fascia in the living dog has been extended to patients Especially prepared or fascia appears to heal solidly

Experience with 158 cases, and follow up observa tions on a series of 53 employees of a firm providing routine medical examinations at monthly intervals, are presented There were no recurrences in the lat ter group after periods of observation ranging from to months to 4 years and no recurrences were re ported in the remaining 105 patients.

JOSEPH GASTER, M.D.

# GASTROINTESTINAL TRACT

Somervell T H. Physiological Gastrectomy Bru

The author has been replacing the extensive opera tion of partial grattectomy by the more modest procedure of lighting the atterial supply of the stomach with good immediate results. The opera

tion of vascular ligature has been done in 400 cases, 160 of which have been studied by test mesh before and 3 weeks after operation, and 82 of which have had a late follow-up including the performance o near a new romaway manning me personnence of fractional test meal and a thorough clinical examin tion. In 380 cases of arterial ligature with or wil out gastroenterostomy only I death could be trace ont gastroenterostomy only I death could be trace The minimal operative risk and satisfactory is results of the simpler operation are believed to give

the procedure a claim to superiority In all case i the procedure a cusing to superantry an an cases a which the total acidity of the lasting fake is abon 60, gastroenterestomy combined with ligature of the arterial supply of the stomach is carried out, except in the cases of patients with gastric ulcer as well as a duodenal ulcer or those in whom make nancy is suspected

The operation of trying the arteries in its simplest form, consists of firmly ligating with fine silk about 5 of every 6 of the small branches which run from the gastroepiploic artery to the stomach wall as far up the greater curvature as possible without pulling at the stomach. The sheaf of yessels on the lener curvature is ligated in lots. The arteries at the pylorus and within an inch of it need not be tied The posterior wall of the stomach is then gently pulled through the opening in the mesocolon and it a usually found that further ligations must be done to bring the number of ligated vessels up to approximatchy five-sixths of the total number Gastroje

Junostomy is then performed. When the arteries are tled in this way the usual effect is an immediate and considerable drop in the acidity of the stomach. A hyperacid stomach be comes one which secretes less than the normal amount of acid. Control studies were made by test ing pro- and postoperative acidities in cases of arterial ligature without gastroenterostomy and in cases of gastroenterostomy without arterial ligature. The results of these studies indicate that the reduc tion of acidity is due to the ligation of the arteries

and not to the gastroenterostomy Fractional test meals were done in 82 cases from 6 months to 6 years after operation. It was found that the lowering of acidity peraists for at least 3 years and the late results showed very satisfactory figures both for the acidity of the fasting fuice and for the average total acidlty during the a hours or so after the meal was given. In cases in which the operation of arterial ligature alone was done, without gastroenterostomy, the early and late results were exactly similar to those in which arterial ligature and gastroenterostomy were combined With regard to the incidence of recurrent (gastrojejunal) olcer of the total number of 400 patients in whom this operation has been done, only I has returned to the bospital with a gastrojejumal ulcer This is in contrast to the incidence of y cases of recurrent ulcera tion in a series of 300 cases in which a gastrectomy

had been done during the same period. It is believed that arterial ligation is the operation of choice in all cases of duodenal ulcer with marked hyper actifity Jose L. Lindquist M.D.

Olsson, O : Multiple Cancer of the Colon (Cancer coll multiplex) Ada radiol Stockh. 1945 26 415

The nancity of clinically diagnosed multiple carci nomes of the colon as compared with the figures from the autopsy room suggests of course that many cases of multiple cancer of this region are not being diagnosed. This is of interest to the roentgenologist. who must not rest content with having established the dragnosis of a cancer of the large bowel but should continue his examination to include the entire colon. Even though the referring surgeon be satisfied with the digital or proctoscopic findings of carcinoma of the rectum, in view of the especial frequency of the combination of rectal cancer with a second cancer in another section of the colon (this combination being found in perhaps a half of all the cases of multiple tumors of the large gut), a complete examination of the entire colon should be made since the tumor which is overlooked in these cases may eventuate seriously

The surgeon who refers his patient to the roentgen ologist frequently merely wants the determination of the upper limits of the tumor which he already knows to be present or he wants to know the length of the agmold for the technical operative value of such de termination. He may even oppose the filling of the entire bowel with the shadow producing medium. The roentgenologist, however should not limit his quest for considerations such as these. Of course, the entire colon should not be burdened with the medium when an acute ileus is present, or in the presence of an almost impervious stenois of the bowel lumen. However in the latter case too much importance should not be attached to the fact that the inflowing of the contrast material in retrograde direction is

In making the decision to break off the examination short of the entire length of the colon the prehiminary roentgenogram without contrast substance should be carefully studied particularly in the presence of acute lieus or when there has been a history of attacks of acute or subacute fleus in order to estimate if the succeeding contrast roentgenogram sufficiently explains the history symptoms and present finding. If then for any reason the examination remains a partial one the surgeon should of course be apprised of the fact that the examination is in complete. According to Crawfoord (Aca br. seand 1934, 14) not less than 63 per cent of his 161 patients with an obstruction presented stenoses.

The author appends 5 case histories of multiple cancer of the colon—the rectum and anal sections are included as part of the colon—from a year's material of from 5 to 60 cancers of the colon and from 700 to 800 examinations. In only 1 of these did the reentgenologist fall to uncover the multiplicity of the condition. Jenkina, J. A.: Carcinoma of the Rectum, with Special Reference to Sphincteric Control Autical. N. Zealand J. Surg. 1945, 15, 15

Radical operation for carcinoms of the rectum must continue to be the method of choice in the majority of cases for which surgery is employed. A brief description of the procedure adopted in cases in which the sphincteric mechanism can not be saved is presented. The author prefers a two stage operation.

The first stage involves exploration through a left oblique abdominal incision to determine the extent of the growth and fixity. If conservative preservation of the sphincters is decided upon a transverse defunctioning colestomy is done. If a radical perineabdominal excision of the rectum is not contamidizated a terminal colostomy is performed. The polyuc colon is exteriorized and divided the proximal stump, held by forceps is retained in the upper angle of the wound and the lateral peritoneal passage is closed by suture the distal stump is closed and funsususcepted into itself as far as possible and placed in the pelvis. The abdomen is then closed.

The second stage is carried out about 3 weeks after the first stage. The perineal part of the operation is done first and completed abdominally A vaseline gauze pack is introduced into the pelvic cavity and commencing about the tenth day is gradually re moved. A catheter and tidal drainage prevent the threatening bladder infection.

The author presents case histories and reports his observations with regard to the various conservative surgical procedures attempted, in which the sphine teric mechanism is retained. He cites the literature dealing with various conservative procedures and the indications for their adoption in selected cases Pathologically various reports have modified the earlier hypothesis of the manner of spread of carci-noms of the rectum based on the work of Miles. For example, Pannett states that the rectum can be safely incised 1 5 cm. below the tumor and 2 5 cm. above. Functional results are mentioned by most writers and all appear to be reasonably satisfied with the control achieved. However Kirschner states that even after perfect healing complete continence is rarely achieved because of unavoidable damage to the sphincter and to the nerves of the sacral plexus supplying it.

The author suggests a preliminary defunctioning

The author suggests a preliminary defunctioning transverse colections when conservative procedures are to be followed. A wider sacral exposure with consequent avoidance of splitting the posterior original wall is suggested. The anorectal sphincteric ring is retained intact, as far as musculature is concerned to avoid loss of function. The author believes that after resection of the rectum the patient must depend upon external sphincters for control, and that this control is inadequate when compared to the normal mechanism. No reference could be found in the literature as to the state of the internal sphincter muscle after operation however it is sup-

posed that the intrinsic nerve supply must be abolished. The normal reflex changes which influence the tone of the internal sphincter become inoperative thereby a loss of defectation reflexes occur There is no doubt that the involuntary nonstriped internal sphincter is important in the control of the anal sphincteric mechanism and that it possesses a continuous postural tone that varies slowly in response to reflexes from the bowel above. Al though the condition of the internal sphincter has not been established after resection of the rectum. it has been thought that its tone was dependent upon the integrity of a local nerve plexus and therefore, theoretically it is possible of recovery following intury

Since the external sphincter plays an important part in voluntary and reflex responses to effort and in temporary control its retention with its nerve supply is advisable. Impulses from the pelvic colon may give the patient warning of imminent action of the bowels and this action may be temporarily restrained by voluntary contraction of the sphincter

and externus.

The Hochenegy pull-through operation gives the most satisfactory results in conservative surgery of the rectum in which the sphincteric mechanism is JOHN E. KARABIN, M.D. preserved

# LIVER, GALL BLADDER, PARCERAS. AND SPLEKY

Robertson, H. E., and Ferguson, W. J. The Di-verticula (Luschka's Crypts) of the Gall Bladder Arch. Path., Chic., 045 40 3 2.

The peculiar outpouchings of the mucosa of the gall bladder known as Luschka's crypts, have been so frequently described that there would appear to be nothing important that could be added to the knowledge of their morphology pathogeneau, or complications. However a closer study reveals so many misconceptions concerning them that an at tempt to clarify their anatomic and pathological significance is fully justified.

The gall bladders studied were from two sources 175 from postmortem examinations and 320 from surgical operations. The authors special endeavor was to identify crypts in various normal and pathological gall bladders. Examinations were made of a sufficient portion from each specimen to afford a fairly accurate picture of the relative number and

depth of the crypts that were actually present. Among the 175 gall bladders from postmortem examinations, 112 were judged to be growly and microscopically normal. The term normal" is used to imply the absence of identifiable slens of any pathological condition that could influence the functions of the gall bladder materially or could contribute clinical phenomena of disease. Of the 112 gall bladders, 65 (58 per cent) apparently contained no diverticula. Thirty-eight of the remaining 47 nor mal gall bladders revealed diverticula, grade 1 and only o could be graded a or 3. The conclusion

appears justifiable that anatomically normal gall bladders contain few diverticula and they tend to remain superficially located

The 120 gall bladders that were rem ved by mr gical operation were from patients who presumably had definite signs or symptoms of gall bladder disease. At any rate the proportion of those gall bladders that contained no li erticula was distinctive less than that of normal gall bladders removed at postmortem examination.

The extensive review of the data furnished by the work of others and of the results of the authors investigations gives a perspective which appears to represent a logical solution of the several problems with which the literature has been engaged for the

past 300 years or more.

The following conclusions were drawn

In approximately half of all gall bladders re moved from persons of more than to years of age the mucosa has invaginated the underlying structures, sometimes as far as the peritoncal lining.

- 2 This invagination tends to form deverticular spaces with branching pouches which occasionally almulate mucous glands. They are lined with cothelium corresponding in every respect to that which lines the mucosa of the inner surface of the gall hladder These cells secrete mucus or a mucushke fluid.
- 3 The greater number of the diverticula open into the gall bladder lumen by ducts, which are often tortuous and narrow Some are cut off in whole or ta part from the lumen and become cysts with budifie branches. When such a group is more or less localized, a formation, often called an adenoma, is produced. This is most frequently found in the fundes of the gall bladder but may occasionally involve more, or even all of the sail bladder wall. The term adenoma

is misleading and inantly applied. Multicystic or multilocular cystic diverticula are more fitting designations.

4. The crypta thus formed may contain bile, hile pixments cholesterol crystals or at times, typical biliary calculi. Exudative inflammation may occur in them up to the stage of abscess formation and even of rupture into the peritoneal cavity The residuam of such inflammation may be obliteration of the epithelial lining proliferation of connective there and collections of lymphocytes and other cells.

5 Increased intracystic pressure, absence of a muscularis mucosae a loosely irregularly arranged muscular layer and the independent response of the muscle bundles to physiological stimuli account for the initial diverticulalike indentations. The increased pressure is, more logically the result of neurogenic dysfunctional states of the extrahepatic biliary system although other mechanical factors such as stones and inflammatory obstructions may play etiological roles

6 Except for the complexity of the branches, these crypts correspond in every other respect to the so-called false diverticula of the colon and armaty bladder they are "diverticula of the gall bladder

7 There is little justification except custom, for calling them Luschka s crypts or Rokitansky Aschoff shuses Not only did these investigators not possess sufficient priority but they falled in several important details to recognize the true significance of the structures that they described

Mascheroni H A., Reussi, C. and Boucau E. F: Internal Biliary Fistulas (Las fistulas biliares internas) Prensa med argent 1945 38 2397

Internal biliary fistules may communicate with a pregnant uterus ovarian cysts the pericardium, urelin, or the pleural cavity. However in the majority of cases the fivitial communicates with the duodenum stomach colon or small intestine. According to one set of statistics of internal biliary fixtules were found among 30 000 autopoise. Puestow encountered internal fixtules in 12 per cent of his rabehts with coloevature.

The man cause of internal fistula is cholelithussis or a cancer of the gall bladder less frequent causes are abscess of the gall bladder and echinococcus crits. As to the pathogenesis pressure by a calculus causes an ulceration of the mucosa, which leads to pervisceritis and the formation of adhesions, necrost, and, ultimately a fistula. Penduodenitis as a sequel of duodenal ulcer may also lead to the establishment of a communication between the gall bladder and duodenum either directly or through a fistula resulting from an abscess between both or gans. A cancer of the gall bladder may invade the adjacent tissues and form fistulas leading to the colon in a great number of cases.

No pathognomonic signs are characteristic of an acute internal biliary fistula. Puestow states that suspicion of an internal fistula is justified in patients with a hepatic colic accompanied by chills fever and jundice especially if such as imptoms are frequent persistent, or progressive

In chronic forms dyspepsia may be the only symptom with nausea vomiting and pains following errors in the diet.

Roentgenological studies are of great diagnostic value. The opaque medium may be introduced through a duodenal tube. X ray pictures abould be taken in various positions such as the supine proper pile lateral and Trendelenburg. The presence of gas in the bibary ducts he a rarity but, if detected it points to the existence of an internal fiatula of the bile tract.

Involvement of the liver is a grave complication found most frequently in fistulas leading to the colon Inasmuch as the prognosis of an internal billiary status is always grave surgical intervention should not be delayed although the operative mortality is relatively high reaching 19 per cent. Especially in statitely high reaching 19 per cent. Especially in statit of miss and delay makes the prognosis poor The fact that bille may be aspirated through a duodenal tube is of no diagnostic value and does not suggest toy special time for the surgical intervention.

Persistent jaundice and the presence of white bile in the duodenal contents indicates hepatitis. The author reports 3 cases of internal biliary fistula.

JOSEPH K. NARAT M.D.

Itols, O A.: Tumors of the Pancreas (Tumores de pancress) Arch Sec argest and, 1944, 6 451

The author offers the following classification of tumors of the pancreas

A. Primary tumors (1) benigm unilocular or multilocular cyst cystadenoma, solid tumor insular adenoma, angiomatous tumor and ampullary tumor (2) malignant epithelioma of the head of the pancreas epithelioma of the body or the tail of the pancreas, cystadenoma, carcinoma, malignant in sular tumor malignant ampullary tumor and sar coma of the pancreas.

B Metastatic tumors with primary neoplasm located in the stomach, spleen left kidney small intestine, or lymph glands.

Adenoma and malignant insular tumor produce identical symptoms

Cystadenoms and cystadenocarcinoms have the same macroscopic aspect and only the histological examination will lead to the correct diagnosis. The differentiation of ampullary tumors of the pancreas and neoplasms originating in the lower portion of the common duct offers great difficulties.

If hydatidiform cysts, pseudocysts and dermoids are excluded pancreatic cysts may be divided into two groups congenital and retention cysts.

Cancer of the pancreas forms from r to s per cent of all cancers found at autopuss. Metastases appear in relatively early stages and are found in three groups of lymph glands subpylone, mesentene, and splenic. A fourth group of minor importance is found behind the pancreatic glands

From the histological point of view a types of cancer of the pancreas may be distinguished papil lary cystic carcinoma, adenocarcinoma, the medul lary type, and epithelioma formed by independent cells disseminated throughout the abundant stroma. The last two mentioned forms probably derive from acmi.

Sarcoma of the pancress is extremely rare JOHLPH K. NARAT M.D

Radice, J. C., and Rivero E.: Statistical Studies of 53 Cases of Turnors of the Pancress (Estudio estadistico sobre cincuenta y tres casos de tumores de pancres) Arck. See argent anal., 1944, 6 489

Of 53 tumors of the pancreas observed by the authors 49 were primary and 4, secondary formations 39 were found in men and 15 in women. Two-thirds of the tumors were found in patients between 50 and 60 years of age. The great majority of the patients were laborers. The largest number of tumors were located in the head of the pamereas, to be followed by that of neoplasms in the tail and the body. Married people predominated in the material observed by the authors.

In numerous instances the diagnostic difficulties were great and cancer of the liver tuberculosis blood cysts of the pancreas tumors of the mesocolon

and cancer of the biliary tract were considered. Among clinical symptoms pain occupied the main place laundice colics of the benetic type, a sensa tion of fullness, nausea, biliary vomiting, melena, and hematements were less frequently observed.

Among complications the following were recorded obstruction of the biliary ducts ascites, liver chrhoals fat necrosis brown atrophy of the myocardium

and pneumonia.

The most frequent type of tumors was cancer The malignant degeneration was accompanied by a histological changes fibrosis, acidophil pecrosis, and flattening of the acini. The authors confirm the observation made by other writers that glandular acini undergo rapid destruction by the cancerous tissue while the Langerhams islets abow attempts at regeneration. In a cases an association of the cancer of the pancreas with diabetes was observed. In 1 case the cancer was located in the head of the pancreas in the second in the tail in the third both in the body and the tall and in the fourth the entire organ was invaded

The most frequent location of metastases was the liver, to be followed in descending order of frequency by the lungs lymph glands and peritoneum largest tumor was the size of a newborn child's head

Metastatic tumors were found nearly exclusively in the male sex mostly in the sixth decade of life. with the location of the primary tumors in the gall bladder bileary ducts esophagus, and lungs.

JOSEPH K. NARAT M.D.

Ceballos, A., Brachetto, Brian D., and Rosenblatt, Insular Adenoma of the Pancreas. The First Case in Argentina. (Adenoma insular de pancreat. Primer caso Argentino) Arch. See ergent ARKE GILL 6 100

A woman, age 37 had been complaining for 4 years of attacks of nervousness profuse perspiration, and tremor during the preprandial periods which disappeared after the ingestion of food. Hypoglycemia, accompanied by general debility tremor persoira tion, mental confusion, found at the clinical examination could be relieved by the ingestion of carbohy drates or an intravenous injection of glucose solution. The differential diagnosis involved a spontaneous hypoglycemia or paroxysmal manufestation of some other condition. No signs of an involvement of the liver hypophysis thyroid gland suprarenal glands or the central nervous system could be found. There fore, an adenoma of the Langerhans islets was nunected.

An exploratory laparotomy revealed an adenoma tous nodule situated at the function of the head and the body of the pancress. The tumor had an ovoid shape 13 by 6 mm. in diameter it weighed 1 55 gm and was encapsulated. The parenchyma of the tumor had a whitish color and an adenomatous aspect. The tumor was divided by fibrous bands into alveoli. The microscopic examination disclosed two types of cells ( ) high cylindrical cells with a clear cytoplasm and irregular ovoid uclei, and ( )

low cuboid or ovramidal cells with a chromoolal protoplesm and pyknotic nuclei. The latter type of cells was in the minority TORREST E. NARAT M.D.

Blanchi, A. E.: Pancreatic Insular Carcinoma (Neeldloblastoms) with Generalized Metastams (Carcinoms insular pancreatico [nesidioblestoms] con metastasis generalizadas) Arch Sec. errent. enel., 044, 6 407

Since the publication of the first case of insular adenocarcinoma in 1927 mmerous articles have de scribed benign as well as malignant tumors origina ting in Langerhans blets. In 1018 Laidway suggested the term nesidioblastoma" for tumors originating in the falets and the term neskiloblastoes for hyperplastic reactive changes of a non-neoplastic nature

The author of this article collected from the lit erature 120 cases of benign tumor involving the

cancrestor falets.

He observed such a tumor in a woman, age 39, who was admitted to the hospital with complaints of intensive premenstrual pains in the left acapular region, occasionally radiating to the right aboulder The complaints were of one year's duration. The patient also had pains in the lumbar region radiating into the lower extremities. At the time of admission numerous white or bluish nodules were found seat tered throughout the body. A bloody expectoration

of 3 days duration was present.

Among the important findings the following may be mentioned the blood sugar was 117 albumin. sugar and acetone were found in the urine the Kahn reaction was negative and the blood count and differential count were normal. Examination of the contents aspirated from one of the nodules revealed nondifferentiated neoplastic cells. Aspiration of the liver was done and the microscopic examination showed large cells with round n cici and polygonal protoplasm. These cells resembled those found in the cutaneous nodules. The identification of the neoplastic cells was very difficult. Atypical mitoses were noticed. A blood examination a weeks after admission showed the presence of myclocytes, meta myelocytes, and normoblasts.

The febrile conditi n led to a fatal outcome. The autopsy revealed cystohemorrhagic formations in the liver nephrosis, hemorrhagic ovarian cysts, hemoperitoneum and hydrothorax on the right side. A circumscribed mass was found in the pancress

which showed a diffuse enlargement

The histological examination disclosed a generalized endotheliosis partially solid and partially with the characteristics of a hemorrhagic angioendothe Various staining methods, such as Mallory's and Van Gieson's, and thionine, allowed a diagnosis of a nesidioblastoma originating in the Langerham islets. The author calls attention to the fact that the blood sugar level remained pormal and that numerous metastases spread through the blood as well as the lymph system.

TORDER K. NAMET M.D.

## MISCRLLANGOUS

Etherington-Wilson W Torbion of the Great Omentum. Brit J Surg 1945 33 142

A review of the literature on torsion of the great omentum yields some 190 cases of all varieties, of which 73 can be considered of the primary or ideopathic type. The author reports 4 cases, of which I was primary 2 were bipolar with a pelvic adhesion, and I was swollen and infected by tubercle bacilli. The a pathological specimens are illustrated

The great omentum may twist as a whole or as a part or strand either may be complete (stranguated) or incomplete (congested) either may be primary or secondary Primary twists are necessarily intra-abdominal and unipolar and no definite cause can be ascertained. In cases of secondary rotation, the condition may be unipolar or bipolar, and occur as a result of herma adhesion, omental deformity or past or present intraperitoneal in flammation. The condition may be acute subscute or recurrent. A combination of factors is probably responsible for the causation of omental torsion. such as Perustaltic pushes by the muscle of the intestines abdominal wall, and diaphragm sudden jerky body actions and rotations direct blows omental disfigurement by tumors overloading or uneven fat distribution pedicle formation scarring raggedness adhesions and bipolar attachments duplacement of the omentum during operation or by abdommal tumors. A history of all such causes is found among the cases recorded. A partial twist having started and caused congestion of the veins with edema, it has been suggested that the shorter and firmer arteries may complete the omental Males are more often affected than females, which may be accounted for by trauma or exertion. The condition is uncommon at the ex tremes of age.

The condition is rarely diagnosed or even suspected. Over 80 per cent of cases are diagnosed as appendicitis, and a much smaller number as per located ulcers or cholecystatis The following points are worthy of notice and should lead to the correct diagnosis on occasion The patient probably from 20 to 55 years of age, and a male gives a history of right-sided abdominal pain which gradually gets worse, is often in spasms and is usually relieved by lying down. Other symptoms and signs are not pronounced and are of little differential value Tendemess and rigidity are not impressive. There may be a history of undue exertion or accident, and a hermal scar or sac may be present. The palpation of a doughy tumor in the midline or to the right, often above the appendix is a suggestive sign.

The treatment consists of early exploration The omentum, or a part, is almost always removed. Occasionally as in one of the cases reported here the unstrangulated omentum is simply untwisted Apart from complications which are remote, few patients have succumbed to the abdominal condi-

JOHN L. LINDOUST M.D.

Eaton, R. B : Forward Abdominal Surgery Canad M Am J 1946 54 19.

The author relates his personal experiences and observations, and the lessons learned during the surgical treatment of 230 patients in a Forward Sur gical Unit at an advanced Surgical Center with the R.C.A M.C The experience began in Normandy and ended in Northwest Germany and Holland Twenty-one of the patients had acute abdominal lemons all others presented battle casualties of first or second priority There were 18 deaths.

The time interval from injury to operation the distance and the extent and site of the infuries are stressed as the most important factors in the out come of the cases. In abdominal cases the optimum time was from 6 to 8 hours and the distance from 10 to 15 miles. The optimum time for operation after resuscitation had begun was left to the judgment of the resuscitation officers who became exceedingly skilled in their ability to determine the correct moment for surgical intervention. Pulse volume and the restoration of peripheral circulation were considered the best guides to the optimum time for surgery Blood pressure was considered of less importance as it was often difficult to get the blood pressure above 80 to 90 mm Hg thus a stable blood pressure plateau was of more importance than the height of a single reading. If the optimum time for surgery was missed secondary resuscitation was usually impossible and a state of irreversible shock was likely However, no abdominal case was con sidered hopeless until a laparotomy had been per formed even though the response to resuscitation was not good

The diagnosis was usually obvious and clear cut. It consisted mainly of determining the general condition of the patient, and the number and course of his wounds. Audible peristalsis usually ruled out an intraperitoneal lesson, but flank wounds with lacer ated colons were exceptions. Chest wounds produced transient abdominal signs which were con fusing but which disappeared with rest and resusci tation. Exploratory laparotomy was resorted to when there was doubt as to the existence of intra abdominal wounds.

Routine exploratory laparotomy incisions were used in most cases but occasionally transverse in cisions from the outer border of the erector spinae to the rectus muscle were used. They gave excellent exposure for flank wounds with kidney involvement, and made it possible to deal with the kidney first and then open the peritoneum to explore the peri toneal cavity Abdominal laparotomy wounds were occasionally carried through the costal margin, which was reflected to give good exposure of the disphragm. liver and cardia.

The rule for the management of large bowel wounds was mobilization and exteriorization Mul tiple wounds of the cecum and ascending colon re quired exteriorization, while less extensive ones could be sutured, and in both cases a short-circulting fliotransverse colostomy was done. Occasionally

wounds of the eccum and ascending colon were sim ply natured and a drain lineared to the area. Spura were feasible with left colon colostomies but gave difficulty and if used should not be over a inches long. Multiple wounds of the colon, and pelvicolon wounds were autured distal to a safety colostomy. Drainage was done in all cases of large bowel con tamination.

Small bowel wounds were preferably autured. Resection was necessary for multiple wounds and for wounds involving the meentery A single long resection was preferred to multiple abort ones. End to-end anastomosis was preferred, with a doublelayer running suture and a few interrupted relalayer running suture and a few interrupted rela-

forcing sutures. Wounds of the sphem were always treated by sphemectomy. Wounds of the stomach were closed primarily with care to watch for posterior wounds when an anterior one was found. Wounds not be pancreas carried a high mortality and were treated by suture and drainage.

Lacerations of the liver were handled by deep sutures and occasionally were reinforced by omentum, but packs were avoided Drainage to the site of injury was considered essential. Bladders were closed in two layers with a cystostomy, care being taken to place the suprapuble take high in the fundus of the bladder

Spilled Intestinal contents and blood in the peritoneal cavity were carefully stocked out at the baginning of the operation. Abdominal wounds werclosed in layers interrupted chromic capit (No. 2 or 3) sutures were used except in the peritoseem. Sulfatiation was med in the peritoseem cavity but the walte was questionable. Sulfathiazole-pendiffile bowder was dusted into the wounds before design of

the skin.

The patients were kept from 10 to 12 days, and postoperative care was meticulous with adequate blood plasma, and fluids. Penicillin (100,000 units per 24 hours) was used routinely and sulfs drags were used when indicated.

Complications were few Evisceration occurred in only 2 cases. Peritootiks, as it is known in civilian practice was rare and only 1 patient was thought to have died of general peritonitis (not proven by post mortem examination). There was not a single instance of feed fistula in this series of cases. Other complications were those usually found in extensive abdominal surrey. Farmacy C. Horsan, M.D.

# GYNECOLOGY

## TTERUS

Macdottra, E. and Baldi E M: Acute Torsion of the Fibroid Uterus (Volvulo de utero fibromatoso o torsion aguda de utero fibromatoso) Rev med quir pat fem B Air 1945 13 512.

Two cases of acute torsion of a fibroid uterus seen during 6 years on an active gynecological service are reported. The patients presented themselves with signs and symptoms of an acute gynecological abdomen, having had trouble for 6 months and 2 or more year, respectively. There were severe intermittent shodminal pain fever and tachycardia but no signs of direct peritoneal involvement. A lower abdominal mass was palpable which produced pain on motion. Pelvic examination confirmed the presence of a nodular mass in the pelvis which prevented definite palpation of the uterus. A diagnostic sign of importance is considered to be the detection of the pulse in the uterins artery anteropic.

Both cases were considered to be torsions of the uterms body on the cervir around the long aris of the organ. These torsions were partial as the cervir was parted in the process and incomplete because the rotation was less than 360 degrees. The authors suggest volvulus as the diagnostic term when the cervir is not included and arial rotation when both body and cervir are implicated). This displacement explains the anternorly palpable pulse of the uterine artery.

Both patients were subjected to subtotal hyster ectomy and made uneventful recovery

HIRAM T LAMORTON M.D

# ADMEXAL AND PERIUTERINE CONDITIONS

Culiner A. The Relation of the Theca Cells to Disturbances of the Menstrual Cycle J. Obri Gys. Bril Empire 1045 52 545

The author introduces this article with a review of a previous study on the relationship between theca cells surrounding the ovarian follicles and disturbances in the menstrual cycle of the baboom. He believes that in the human being many menstrual species have been attributed to the presence of stretic or cystic follicles, while consideration of the accompanying masses of these cells has been neg

The material from which his conclusions have been drawn for this discussion was collected from ovaries and uter obtained at operation upon women who had complained of excessive uterine bleeding or other symptoms of endocrine disorder. There is no tabulation of the cases but a running discussion is given in which the development and changes in the theca cells are described for the primordial follicle corpus interim arteric follicle lutern cyst, and the corpora ableans.

The author describes luteinfaction of the theca cells around arretic follicles in ovaries with a co-existing corpus luteum, and differentiates between the luteinized theca and granulosa cells by the presence of blood vessels in and about the cells of the theca. Such vessels were not found to permeate the granulosa cells, although in corpora lutes the vessels extended between the lobules of the cells, but not among the cells themselves. He noted an intense vascular response with capillary hemorrhage into the interatices of the theca cells as a frequently associated finding in diffuse theca lutenization.

Theca cell Intelnization around atretic follicles may be without clinical significance in ovulatory cycles. The formation of extensive areas of lutein theca cells may be visible macroscopically around the follicles but in other instances the association with the follicle may not be readily apparent. The most frequent type of change noted was one in which the cells were found to be similar to those seen as the paralutem cells of an approximately 30 day old corpus luteium. Similarity to the cells of the adrenal center was emphasized.

The author states that the character of the uterine reactions associated with these cells is such that neither estrogenic nor progestational influences can be attributed to them. Their activity suggests to him a third overlan homene which may exert androgenic activity or a modified secretion of the known varieties which is capable of distorting the balance between simultaneously acting steriod homenes of the mensitual cycle. Ground Beadanna M.D.

# EXTERNAL GENITALIA

Novak, E. and Stevenson, R. R.; Sweet Gland Tumors of the Vulva, Benign (Hidradenome) and Malignant (Adenocarcinome) Am / Oht., 1945 50 642

The most common location of sweat gland tumor of the vulva is on the labia majora and the next most common is in the paralabial skin or perineum. The gross appearance of the lesion varies. It is always small rarely reaching a size larger than that of a cherry and usually not over 1 cm. in diameter. It may present as a small firm subcutaneous nodule like a small skin fibroma, covered by intact skin. In other cases it is soft, resembling a small sebaceous cyst, for which it is commonly mistaken. Not in frequently there is a small superficial granular area on the surface. If pressure is made on the small nodule, one is apt to be surprised by the fact that. instead of a typical sebaceous exudate the material expressed is reddish brown and pulpy. This should at once suggest the real nature of the lexion. There is no pain and often no tenderness or soreness especially when the skin surface is intact, and the nodule is ordinarily quite movable. In a consider

able number of cases the nationt herself has not noticed the podule, its removal being incidental to

vaginal operative procedures.

The sweat gland tumors of the vulva constitute a relatively rare but highly interesting group Clini cally they present as small and innocent looking growths on or near the vulva, but to one not familiar with their histological appearance the microscopic picture is apt to be rather startling and perhaps lead to the diagnosis of adenocarcinoma. However in only I case in the literature that of Eichenberg was there apparently unquestionable evidence of malig nant change, both clinical and microscopic. All other cases, including the 15 cases reported herewith, were clinically benish and all have been cured by almple excision.

Granted that the characteristic microscopic pic ture of these growths might well in other tissues lead to the diagnosis of adenocarcinoma, there would seem to be no justification for applying the term adenocarcinoma to these notoriously benish sweat gland tumors. It is entirely possible, and perhaps even probable that some instances of the rare primary adenocarcinoma of the vulva may be of sweat gland origin, as in a cases of the group included in this article. Such an origin however is difficult to

establish. Fifteen cases in white women are reported, the

youngest being 28 years and the oldest 67 EDWARD L. CORDICIL, M.D.

## MISCRILANEOUS

Aguilers de Alvarez, M. D : Action of the Synthetic Estrogens on the Metabolism of the Lipids (Accion d los estrogenos sinteticos sobre el metabolimpo d los linidos) Arch farm. bloquim., Tucu main, 945 1 3 3

This study concerns the relationship between the estrogenic hormones and the metabolism of the lipids in the mammal, and compares the results of the author with those obtained by other authors in the vivinarous vertebrates. The syn authors in the viviparous vertebrates. thetic hormones were used exclusively since they are the easiest to obtain and their results are, in general, similar to those of the natural hormones. By the lipks the author means that beterogenous group of substances characterized by their insolubility in water and solubility in the so-called fat solvents such as ether, chloroform boiling alcohol, petroleum and other. The tissues of the experimental animals used (castrated and normal rats) were extracted with alcohol and ether according to a slightly modified method of Bloor Total phospholipids were extracted and determined according to Fiske and Subbarow with the photometer of Pulfrich. The choline frac tion of the phophoslipids was then determined by the technique of Marenzi and Cardini (J Biol., Chem 1943, pp 363 371) also the values for sphingomye lin. Finally the values for cephalin were calculated by subtracting those of the choline phospholipids from the total phospholipids, and the lecithin was

calculated by subtracting the values for sphingomyelin from the choline phospholinids. The author's determinations are given in extensive tables in the original article, and in every instance compared as a norm with the figures given by the aforecited work of Marenzi and Cardin

In all the organs of the noncastrated animals injected with stilbestrol propionate there was a rela tively marked decrease in total phospholipids, with no change in the plasma values. The lecithin showed an increase in the brain and kidney and a decrease in the heart and lung without appreciable change in the spleen and liver the cephalin exhibited an appreciable increase in the heart and blood plasma. but otherwise had decreased more than 90 per cent. In the normal animals injected with propionate of stilbestrol the sphingomyelin displayed an enormous decrease to mere vestiges in some organs or even to complete disappearance.

In the castrated animals the movement of the values m every instance tended to follow those exhibited by the normal animals except that the changes

tended not to be so pronounced When the values for the cited lipid fractions are compared with the values for total phospholipids instead of with the normal values established for noninjected animals by Marenzi and Cardini, it is seen that in normal, that is, noncastrated, animals with injections of stillbestrol, the lecithin shows a

tendency to increase, while in the castrated animals, it has a tendency to decrease, the cephalin following the inverse course. Although the sphingomyelia decreases in the castrated animals, it does so in a lesser degree than in the normal animals. Castration seems to inhibit in part the effects of the stillbestrol

on the phospholipids of the tissues. JOHN W BEREIGHAN, M.D.

Schaub I G and Davis, J E.: The Significance of Streptococci Isolated from the Female Urinary Truct. Bull Johns II phins Uasy 1945, 77 372

A review of previous reports in the literature clearly shows that with the exception of alpha and gamma enterococci (often grouped as streptococcus lecalis) the relation of streptococci to infection of the unnary tract has received little attention. The present authors have determined the incidence of streptococci in a senses of 9,052 consecutive cultures from catheterized urme specimens of obstetric and gypecologic patients.

The organisms were isolated and identified by accepted procedures, and classified as follows. alpha streptococci, beta streptococci, gamma streptococca, alpha and beta enterococci (streptococcus fecalis) and microaerophilic streptococci. The beta streptococci were further classified into serological groups A B C, and D, and "streptococcus-group not determined. This last group included organisms that had falled to react with antisers of the other four groups. It is the group A bets strep-tococci which are highly pathogenic for man, the cause of the acute and severe streptococcus infec

tions, and the most frequently isolated from clinical material

In the authors series streptococci occurred in 7 160 enliness, an incidence of 11.8 per cent of the total number of cultures. Of the total number of streptococci 54 per cent were alpha and gamma enterococci so per cent were alpha streptococci 12 per cent were beta streptococci and the small remainder were divided among the other categories. Organisms of the highly pathogenic group A beta streptococci were found in only 3 cases in the entire series. The relative incidence of these organisms indring by their incidence in other clinical matenal is the reverse of what might be expected Therefore, the case histories of too gynecologic nationts from whom these organisms had been noisted were studied in order to determine the nathorenicity of the various streptococci in the female unnary tract.

Streptococci were found to be the sole cause of clinical disease in 25 2 per cent of the cases reviewed and were found to be involved with other organisms in 28 8 per cent. They were regarded as etiologically

significant in 54 per cent of the cases

The relative occurrence of the various streptococci with escherichia coli was studied and it was determined that the alpha and gamma enterococci were unvolved with escherichia coli in a significantly higher percentage of cases than the other streptoocci with the exception of the gamma streptococci with the exception of the gamma streptococci.

In an per cent of the patients from whose urine streptococci were isolated, no clinical evidence of urinary tract disease could be found in the history. The authors suggest the possibility in these cases that the attreptococci may have been the cause of a past disease or may be responsible for future exacer bations of urinary symptoms.

L. JAMES TALBOT M D

Stoltz, H: Mailgnant Tumors of the Female Genital System (Tumores mailgnos do aparelho genital feminino) An. brasil gin., 1945 20 327

A review of the cases of malignancy of the female generative tract seen over the 10 year period from 1933 to 1945 and an account of the improvement of the facilities for conducting such work at the Clinica Ginecologica de Facuildade Nacional de Medicina of the University of Brasil in Rio de Janeiro are presented. The results are in accord with the general figures with regard to the location of the neoplasm age and race incidence as well as the histopathological types and relation to the births.

On the basis of severity these cases are classified into four groups according to the League of Nations standards. Of the cases of cancer of the cervix (234 cases) 7.3 per cent were early cases and only 32 9 per cent were in groups I and II combined.

The most frequent organ involved was the uterus Among the 277 cases (29 recurrent lesions) including lesions of the bladder sigmoid colon, rectum mesen tery breast, and uterus lesions of the uterus ac counted for 234 of them 220 being in the cervix, 4 in the cervical canal and 10 in the body

The treatment given is determined by the degree of invasion the histological type, and the presence and extent of secondary infection. Surgery radium and roentgen therapy are used in various combinations. Some details of the irradiation technique are myen.

Much improvement in diagnostic and therapeutic methods has occurred. For the first five year period the results may be given as follows of 114 patients treated 16 died during treatment and 31 were given only palliative therapy. Of the remaining 67 10 or 14 9 per cent presented clinical cures after a period of 5 years.

The local socioeconomic factors influencing admission for early diagnosis as well as the end results are dracussed. Numerous detailed tables are presented showing the frequency of location of the lesions by organs percentage distribution by degree of Invasiveness in cervical lesions frequency of the hato-pathological types in all organs, the age color and parity factors concommitant disease incidence the family hatory of neoplass previous surgical operations and the frequency of various therapeutic methods which were applied.

HIRAM T LANGETON M.D.

#### OBSTETRICS

#### PREGNANCY AND ITS COMPLICATIONS

Leverton, R. M., and McMillan, T. J. Meat for Pregnant Women. J. Am. M. Ar. 1946, 301 134.

The importance of adequate protein intake to mother and child has been well established. The investigations endeavored to see the results from the simple dictary recommendation "Eat plenty of mest—have a generous servine at least twice a day"

Private patients, all under 33 years of age, were selected. In addition to 3 regular meals per day they received 3 ounces of lean meat. Two control groups were used. All the women were about in the same stage of pregnancy and had the same hemoglobin. One group was given vitainia B complex supplement, while the other group received no supplement. These additions to the diet of meat and Vitamin B were begun early in the fifth month of pregnancy and continued for three mouths siter delivery.

The women whose intake of protein was augmented by receiving a 5 once serving of meat daily had higher hemoglobin and red cell values, less edema, and more success in lactation than the women who received a supplement of B complex or those who received no supolement.

Common T

CATHERINE B. HEIR, M.D.

Ware, H. H., Jr., and Winn, W C.: Ectopic Pregnancy South II J 1945, 39 44.

The early diagnosis of ectopic gestation is dependent on the following

1 Abdominal pain usually unflateral, frequently described as harp landnating stabling or testing, but sometimes crampilke and usually intermittent even though dull. The pain usually has a definite onset and is frequently noticed after exertion de fecation, and sometimes after intercourse. The exercity of abock is in proportion to the rapidity of

severity of shock is in proportion to the rapidity of orset and the amount of internal hemorrhage. 2 A careful history which reveals an irregularity of the menses, either in interval or amount and in

duration of the flow Amenorrhea for one month or more is frequent in ectopic gestation.

3 The presence of a unilateral tender boggy pelvic mass, which was diagnosed in 60 patients, or 51 per

cent.

4. Manipulation or pressure on the cervix. This

causes severe pain in most cases.
5 Slight bloody vaginal discharge, which was

observed in 75 per cent of the patients.

6 A rapid pulse rate associated with low hemoglobin, and a normal or alightly elevated temperature. This is very suggestive of ruptured ectopic gestation.

7 Pelvic examination. This should be extremely gentle and limited to one if possible.

Titus says "Expectant treatment for an ectopic pregnancy at any stage and in any location is highly hazardous, as the sac may rupture without a moment's warming and the patient die from the ensuing hemorrhage." The authors emphasize that operation for removal of an ectopic pregnancy should be done as rapidly as possible after the diagnosis is made. Casaus Baron MD

Barnes, J., and Browne F J: Blood Pressure of Rolativas of Patients with Tozemia of Late Pregnancy (Preliminary Note) J Obs. Gys. Brit. Empire, 1945, 52 559.

The authors present a prelimbary report on a study which is in progress to determine what part, if any a familial tendency toward hypertension plays in the eriology of the toomias of pregancy Estimations were made on 240 blood relatives of 192 patients who had been admitted to the obsertire unit of the University College Hospital in London because of tunemia. Estimations on a courte group of 65 relatives of 47 patients who were normal were also made.

There was no demonstrable difference in the blood pressure recordings between the relatives of towesic and those of the control patients except in the group of towesic women with essential hypertensions gradual that proper charge with preparancy. In this group it was perhaps significant that 16 of 18 mothers showed defaults hypertension. Geomes Bakowaya, M.D.

Catro, J. A.: Brow Presentation. Four Cases Observed in the Maternity Clinic in Bookta (A projecte de la presentación crificion en posición de frento y de cratro casos observados en la Cinica de Maternidad de Bogotá). Rer elsi, gís. Caracia, 945, 5. 46.

In 4 instances of labor in brow preentation, ill in young primiparas from 50 to 50 years of age, the purguancy had been completely normal will delivery at term of normal bables of about normal weight from 9 600 to 3740 gm. In silt, the petr's and birth canal was without abnormality yet the duration of labor was markedly beyond the normal for this type of presentation and so infant was delivered sportaincomely. One child however was the only mortality

In the first patient premature rupture of the memnecessary. Attempts at conversion of the present toon into the face or vertex variety, and attempts at high forceps failed, and a dead child was delivered after to bours of labor by a high, laborious tacotripy. After this amount of manipolation the patient's prespection was naturally stormy with fever a painful uterus, feld lochis, and endomentists.

In the second case the membranes were ruptured after nearly a days of labor and the cervix was dilated to a diameter of a cm. However after a fur ther y hours of strong pains the head was still mobile and dilatation had not greatly advanced a cesarean section was done with happy results for both the mother and child

Opposition of the relatives to a cesarean operation and the slow but relatively favorable progress in the third delivery of this series induced an expectant attitude, at least until dilatation should be complete. This decrino was made at consultation 33 hours after the initiation of labor at which the consultants insisted that delivery would occur spontaneously in a few hours. Yet 13 hours later after 5 hours of powerful labor pains and although dilatation was complete and the head had rotated from the mento-posterior to the mentoanterior position the mem branes had not yet ruptured, and the consultants now acknowledged the necessity of interference. A difficult forceps operation resulted in the delivery of a lurng child.

In the fourth mother of this group the fetal head became fixed in the pelvis to hours after the initia tion of labor and an hour later the membranes reptured prematurely with rapid dilatation of the cervir. Eight hours later in the presence of continuous volent labor efforts the head became fixed in the right mentoposterior position a finger breadths from the penneum. A relatively easy forces poperation resulted in the extraction of a living child in the

mentoposterior position.

His own experiences and a perusal of the medical herature brought the author to certain conclusions which he hopes may prove of value to the practicing physican.

These conclusions are rather briefly as follows
I Brow presentation causes grave dystocia even
with a normal pelvis and small fetus

2 Spontaneous delivery in this condition is rarely seen.
3 In the presence of concomitant complications

crearean section is frequently an adequate procedure and the least difficult one.

4 Recourse to sedatives and antispasmotics is of

4 Accourse to sedatives and antispasmotics is of great value while waiting for spontaneous delivery and while preparing for intervention.

5. The technique of procedure should be chosen stronting to the individual case to safeguard the life of the mother and child the operator being guided, of course by the following considerations (a) a restonable period of waiting (b) resort to cesarean section when vaginal delivery can be anticipated to cause difficulty and there is still time for surgery (c) the use of forceps when the head is fixed in the Pelvis with deep anesthesia and previous episotomy (d) symphysotomy if indicated and finally (e) basistoripay when the expectant period has proved a fallure, or when negligence or lack of comprehension of the physician renders this disagreeable procedure obligatory.

6 Patients with brow presentation should be transferred to a specialized clinic or hospital to be cared for by a competent personnel and where creavishing will be ready to cope with any complica-

tion which may arise

7 The obstetrician should be above everything a good doctor and combine common sense with his technical knowledge John W Briman M.D

Thomas, R. C.: Rupture of the Rectus Abdominis Muscle during Pregnancy J Obst.Gyn.Brit.Em fire 1945 52 580

The author reports on his second case of ruptured rectus abdomnis muscle during pregnancy. The number of such cases reported in the literature is 31 Eighteen of the 31 cases gave a history of respiratory trouble 5 occurred with the onset of labor a followed a fall and 1 case occurred after labor during the course of typhold fever Of the 31 patients, 3 were primagravidas 24 multigravidas, and in 4 the parity was unknown. The treatment in 20 cases was operation 4 of the patients died

The difficulty in diagnosis is great, shown by the fact that in only 9 of 32 cases the correct diagnosis

had been made.

The symptoms in the author's case that of a 34 year old para vi who was 33 weeks pregnant, were faintness pain in the right side and vaginal bleed ing with a history of bronchitis for a weeks Exami nation revealed Cullen saign and an extremely tend er uterus most of the tenderness being above the uterus. The hemoglobin was 40 per cent. Surgery was advised and to ounces of fresh and old blood were removed from the whole length of the posterior aspect of the rectus muscle extending up to the right costal margin and down to the aymphysis pubis. All of the bleeding vessels were tied and the cavity was packed Five days after the operation the patient went into labor and delivered a 3 pound 12 ounce stillborn female CATHERINE B HESS, M.D.

Shute, W., and Browne, F. J.: The Prevention of Premature Labor. J. Obst. Gyn. Bril Empire 1945, 52, 570.

A series of 65 cases of threatened premature labor with a resultant salvage of 73 per cent is presented. This problem is acute according to some statistics. In 1941 there were 144,693 fetal and neonatal deaths in the United States. The estimated number of premature births in the United States in 1942 was 155,000 and 33 500 of the premature infants died in the first month of life. The solution of the problem does not seem to be in saving premature infants but rather in preventing premature infants but rather in preventing premature.

In this study it was found that a tendency toward premature labor could usually be predicted by finding a blood estrogen excess in early pregnancy. This occurred in 87 per cent of the 38 cases tested. A blood estrogen test is made routinely at the patient s first prenatal visit. This serves as a guide to the danger abased.

Patients developing uterine tenderness, sacral backache spotting loss of amniote fluid or a feeling of prolapse or impending menstruation are treated with Vitamin E. Only large daily doses of from 75 to 125 mgm of alphatocopherol are effective. These and larger doses can be given throughout pregnancy

until term. This was the only therapy given with or without temporary rest in bed

Among the 109 patients included in this and a previous report, there were 6 monsters and 92 normal living children delivered.

CATHERDOR B HESS, M D

#### LABOR AND ITS COMPLICATIONS

De Gou ea, L. R. L.: Delivery of the Transverse Presentation (O parto em apresentação córmica) Arch brasil med 945 35 39.

This article comprises a rather complete discussion of delivery of the transverse presentation, and includes as references.

A brief historical review indicates that the condition was recognized even by the more primitive races and that they undertook some measures for its correction.

Consideration of the etiology incidence varieties, diagnostic meneuvers, clinical course prognosis, and prophylaxis are presented in considerable detail as

are the methods of treatment. The author's own cases, no in number were seen over a 4 year period. The incidence based on a 37 month period from June 1 1941 to 1949 1 1944, revealed transverse presentations in 64; per cent of 3753 single pregnancies and in 3 per cent of 3753 single pregnancies and managed 3 were single pregnancies. Of the 10 cases managed 3 were single pregnancies is was of wind pregnancy (second child) and 1 was an abortion. The cause for this presentation in 9 of these cases was believed to be due to failure or inability of the uterus to maintain proper control over the fetus either because of laxity or flacedidity of the former or small size of the latter and in 1 case it was due to multiple pregnancy.

Two cases of spontaneous delivery occurred once by conduplicatio corpore with a macrasted 8 month premature niant and again by the mechanism of Douglas in an abortion occurring in the sixth or seventh month of pregnancy. Two cases were managed entirely satisfactorily by version and extraction. Five cases in which the fetus was deal were managed by destinative operations—decapits tion—without maternal injury. One case with ruptured uterus and peritonitis was seen the woman had been in labor more than 48 bours because of a prolapsed hand. Laparotomy was performed but the nation and the more than a second of the processing of the second of the

#### MISCELLANGOUS

Gordon, C. A.: Hemorrhage as the Most Frequent Cause of Maternal Death. An Analysis of the Puerperal Deaths in Brooklyn, 1944. Am J Surg. 945. 70. 77

Each year since 1938 the Brooklyn Committee on Martenai Welfare has analyzed in detail the maternal mortality. In 1944 there were 51 of 52 that and 62 deaths, a rate of 124 per 19,000 this represents a reduction of 8.1 per 19,000 over 1940.

Thirteen deaths occurred early in preguancy to from abortion and 3 from ectopic pregnancy. To renia was responsible for it deaths 6 infants were undelivered. Infection caused the largest number of deaths—50. Ceaarcan section was followed by 8 deaths (6 from infection and 2 from hemorrhaps). Ruptured uterus accounted for 6 death (3 spontaneous, 2 following version and extraction, and 1 after forces delivery).

Hemorrhage was considered as the primary cause of death in only 8 cases and as a secondary cause in 3 more cases however in reviewing the cases the author states that serious bemorrhage occurred in 35 cases. He does not believe, however that it was the primary cause of death in all instances.

Although definite improvement in the material mortality was noted, forther advances are be made. The record of deaths from bemorthage is proof that the precautions against death from tha cause are inadequate. Blood plasma is not sufficient in replacing the lost blood, the importance of adequat amounts of whole blood cannot be overemphasized nor can delay in replacement be condocted.

J ROBERT WILLSON, M D

## GENITOURINARY SURGERY

## ADRENAL, KIDNEY AND URETER

Larsen K.; Method for Examination of the Func tion of Each Kidney Separately scand 1945 123 56

The question of function of the individual kidney is highly important to the internist. The author found that insertion of ureteral catheters for measurement of individual kidney function was too maccurate because urine ran alongside the catheters into the bladder He presents a formula for calcula tion of the function of each side designating the amounts of urine produced by the right and left kidneys in the experimental period respectively as Dand S the amounts of urme collected through the right and left ureteral catheters respectively as d and s and the bladder urine as Bl He gives the following equation D+S=d+s+Bl

If the urea concentration of the urine for the right and left ureteral catheters and from the bladder is respectively Ud Us and UBI the following equa

tion is also true

 $D \times Ud + S \times Us = d \times Ud + S \times Us + Bl \times UBl$ . From these equations D and S and afterward the clearance from each kidney may be calculated easily After introduction of the ureteral catheters the blad der is lavaged and emptied with a catheter after removal of the cystoscope Then precisely 100 ml of water are introduced into the bladder and the collection of unne from the ureteral catheters com mences. At the conclusion of the experimental period the portion of the bladder content which will run freely is evacuated After this the collection of unne from the ureteral catheters is discontinued and immediately 50 ml. of water are injected into the bladder and withdrawn immediately after the first 10 to 15 ml. are discarded the following 10 to 15 ml are collected for analysis If the urea concentration of this portion is designated as USk and the urea concentration of the bladder as Ubl that part of the bladder content that was not evacuated at once can be calculated from the equation

**1**×UЫ=('**1**+50)×USk

Therefore the amount of bladder urine is bladder content minus 100 In the second equation the last term is replaced by bladder content in ml XUbl The results are controlled in the experiments by the determination of both the urea and creatinine clear ance. This method is especially suitable for uni-lateral kidney lesions. Error may result in patients with pronounced hydronephrosis DAVID ROBERBLOOM, M D

Rabort F., and Magaidi, P : Renobronchial Fistula (Fistula renobronquial)

A woman, aged 30 years was admitted with com plaints of persistent cough and pain in the left flank.

Nine years prior to admission she had had a stone removed from the left ureter and for 1 year she had had left scrofibrinous pleurisy accompanied by renal

colic.

One year prior to admission she had noticed a painful tumeraction in the region of the left kidney A physician made an incusion from which malodorous pus escaped The remaining fistula has been treated with curettage local and oral administration of sulfanilamide, injections of prontosil and drainage. Injections of liplodol into the fistula did not clarify the situation Hemorrhagic purulent expectoration and subfebrile temperature did not yield to injec

tions of calcium gluconate The local examination disclosed a fistula in the left costolumbar region from which a dense purulent secretion was escaping. The urine contained a con siderable amount of pus. No tubercle bacilli were found in the sputum The sedimentation rate of the erythrocytes was accelerated \ ray studies of the chest showed a diffuse shadow at the base of the left lung suggestive of a pachypleuritis Poor elimina tion of uroselectan injected intravenously was noticed on the left side Ascending pyelography showed sodium bromide solution in the left lung Prontosil injected into the fistula appeared in the sputum Indigocarmine injected intravenously appeared in the right ureter 5 minutes later while no dye was found in the urine from the left ureter for 15 minutes

A left nephrectomy was performed and the patient after the injection

made an uneventful recovery The authors conclude that a renobronchial fistula, although a rare complication should be kept in mind if a patient with symptoms of a previous renal or perirenal lesion complains of persistent cough with a purulent sputum Nephrectomy usually cures the pulmonary process.

Fontaine, R., Forster E. and Ambard D: tirpation of the Aortiorenal Ganglion in the Treatment of Painful Hydronephrosis (Lextir pation du ganglion aortico-rénal dans le traitement des petites hydronéphroses douloureuses) Res chir Par 1945 64 110

After unliateral nephrectomy the function of the remaining kidney is improved when the aortorenal ganglion is removed. The same favorable result is obtained in cases of painful hydronephroals. The different surgical methods are discussed

Resection of the splanchnic nerve and resection of the superior part of the lumbar sympathetic are mentioned as alternative methods to extirpation of the ganglion In 7 of 9 cases the result was excellent partial improvement was obtained in 1 case and no success in I

Not only does extirpation of the ganglion give definite and lasting relief to the pain and colic, but it improves the function of the kodney at the same time. It is still an open question whether the dilatation of the renal pelvis and ureter is also favorably influ enced by the operation. The treatment is causal rather than symptomatic.

WHENTER M. SOLMER, M.D.

Cristol D S., Mc Donald, J R., and Emmett, J L.; Renal Adenomas in Hypernephromatous Eldneys; a Study of Their incidence, Nature, and Relationship. J Urel Ball., 1946, 55–18.

The resemblance between renal adenoma and car clnoma has been apparent to many pathologists. The material used in this study was derived from surgically removed kidneys which were the sites of proved Grawitz tumors. A total of 567 kidneys and contained tumors were examined. The microscopic sections studied consisted of (1) 122 lesions suspected of being cortical adenomas, and (2) numerous sections of renal carcinomas located in the same kidneys from which proved renal cortical adenomas had been removed. The diagnosis could be verified in only 37 of the suspected renal cortical adenomas. All but one of these adenomas were largely papillary in structure. The exception was one that suggested an alveolar structure. As has been pointed out by many men writing on this subject, too often an adenoma will exhibit characteristics of more than one structural type. The largest adenoma in the series measured 4 mm. in diameter The smallest was barely perceptible with a hand lens. More than r adenoma was found in 7 kidneys. The largest num ber of adenomas in any 1 kidney was 7. As with other investigators this series would indicate that there is an increasing prevalence of adenomas as well as of carcinomas in the decades past middle life.

Adenomas appear in the renal cortex as single or multiple grayad white yellow or brown nodules. They vary in this from that which is hardly discernfile through a hand lens to the size of a walnut. Many are multiple and they are frequently found in both kidneys. Adenoma are seen to occur more frequently in kidneys containing clinical cancer than in significant series of kidneys examined at autopsy Reasons are presented for considering adenomas as

malignant growths.

Ackerman, L. V: Mucinous Adenocarcinoms of

the Pelvis of the Kidney J Urel Balt., 1946, 55 36.

The case of a 66 year old man who presented a mucinous admocrations of the renal pelvis is reported this is the first case recorded in the literature. The patient experienced attacks of renal cole at sanual intervals 1 as years. Eight years previously and at that time a left rephretionly was done. The kilney showed parenchymal destruction so that it was only a few millimeters thick in many zones. The pelvis and unter showed alteration of the linking pithelium with evidence of chronic inflammation. Some areas showed equations metaplasia and this

gradually underwent a transition to zooes of piled up epithelium with vacuolated much containing cells which resembled morphology of the large lowel. In areas there were papillary projections similar to those seen in rectal polyps. The renal corter showed hyakinized glomerull and some cystic formation with flattened entitledial indire.

Six years following the nephrectomy a nonrainful swelling developed in the left flank along with abdominal enlargement which suggested intraperitoneal fluid and nodular masses. Under the left nephrectomy scar there was found an irregular mass firmly attached to the underlying atroctures. The urine showed much albumin with pus, bacteria, and occasional red cells. A needle biopsy of the mass showed a few cells forming actni, along with intra cellular and extracellular mucm. The patient died within 6 months and the autonsy demonstrated a mucinous adenocarcinosus involving the liver diaphragm pleurs stomach, pancreas, and small bowel with lithusis of the right kidney and squa mous metaplasia of the pelvic epithelium. The significance of the spread is that it was not to the regional lymph nodes but resembled that of a pseudomucinous tumor of the overy

The author asks the interesting question as to why the left renal pelvis underwent glandular meta plasta and the right pelvis, squamous metaplassa. ROSSET LEG. [8, M.D.

Fish G W and McLaughlin, W L.: Liposarcoma of Kidney; Report of a Case Presenting an Unusual Syndrome. J Urel Ball., 946, 55 35.

The authors report the case of a 35 year old while femal with liposarcons of the right kidney which is the eleventh such lesion reported and the serenth so reported in an individual with the theorems calcrons syndrome (knobbly hardening of the brain). In addition, a additional cases in children are menoused (z) that of a boy of y years who showed tuberous sclerosis of the brain, and (s) that of a boy of y presenting the classical features of tuberous sclerosis, and although death ensued of cerebral kences an articry was grower.

stons an autopsy was refused.

Tuberous scienosis is discussed briefly in the article and attention is called to the concomitant findings of greasy gray red lealons of the face (adenome sebaceum) in butterfly patterns and mental deficiency coupled with convulsive sciences. The presence of renal pathology is referred to and said to consist of either a single renal lesion although more often multiple bilateral neoplastic areas of primitive mesenchymal cell types (anglo- fibro- endothellomyo- and lipoblastomata) are found. The lessons are congenital deformaties of the ectoderm and mesoderm, and demonstrate a strong hereditary factor The individual with tuberous scierosis sedom lives more than so years, and in every instance there is present the previously described skin lesion in 80 per cent of the cases the renal neoplasm is present. In a smaller percentage there is an associated rhabdomyoms of the heart, fibromatom,

and malformation of other organs including the

skeletal system.

The author a patient was seen repeatedly during a 4 year period She had leasons of adenoma sebaceum and neurofibromatosis on her face back, and left fourth toe There was a marked cardiac systolic murmur and a large abdominal tumor on the right side. There were no other significant findings except a profound anemia. Intravenous pyelograms showed an enlarged and distorted right renal pelvis. There was no familial history of tuberous sclerosis although one sister was confined for insanity and a brother was treated for intense phobias the patient herself was somewhat unstable emotionally

The year before the patient was seen originally an exploratory celiotomy was done to ascertain the cause of fever abdominal tumor and anemia similar attack occurred a year later and the anemia on this occasion required the use of blood transfu

rious.

Three years later a similar attack of fever abdominal tumor, and anemia confined the patient to the hospital On this occasion the tumor seemed larger Another attack was experienced a year later and on this occasion the hydronephrosis showed progression along with elongation of the renal pelvis and calyces together with distortion suggesting hemorrhage. Upon nephrectomy the kidney substance was found to be almost completely replaced by various sized nodules of friable, grayish yellow tissue with nodules at the upper pole extending behind the liver The total weight of the kidney tumor was 1,400 grams. The tissue showed cytologically anencapsulated liposarcomas which were character itically slow growing and nonmetastasizing but there was local recurrence and in addition, renal parenchymal compression.

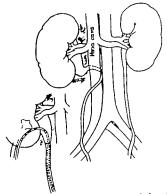
The postoperative course was complicated by a severe transfusion reaction but at present (2 years following nephrectomy) the patient is working and claims to have unusually good health

ROBERT LICH, JR., M D

Greene, L. F., and Kearns W M Circumcaval Ureter Report of a Case with a Consideration of the Preoperative Diagnosis and Successful Plastic Repair J Urol. Balt. 1946, 55 52

The authors report a case of circumcaval ureter this is the thirty third case reported the second preoperatively diagnosed and also the second suc cessfully repaired surgically although it was the fifth

in which such repair was attempted The patient was a 29 year old white male who had an attack of pain in the right costovertebral angle followed by the passage of urinary calcult a year prior to admission and then a recurrence of the pain 3 weeks before hospitalization Excretory urography demonstrated a right hydronephrosis with dilatation of the upper third of the ureter which ended abruptly and at this point there was a gentle curve of the weter with its convexity directed superiorly and medially the remainder of the ureter was normal.



Findings at operation Surgical repair shown in Fle inset

The operative findings and repair are depicted in Figure 1

The authors conclude that there is need of prolonged ureteral splinting after anastomosis of the ureter since in this case early removal of the splinting catheter was the cause of much concern, and the repeated introduction of ureteral catheters was nec essary in order to reduce and finally obliterate the extravasation present at the site of anastomosis The anastomotic site was splinted and drained for the greater part of 39 days postoperatively and the urnary infection was controlled by the use of one of the sulfonamides. Seven months after operation, at the time this article was written the urine was free of infection or any abnormality and the patient was asymptomatic. The kidney was almost normal, but ureteral dilatations at regular intervals were con-ROBERT LICH, JR M.D. sidered advisable

Soley P J : Ureteropelvic Obstructions in Children. J Urol Balt 1946 55 46.

Ureteral stricture was found once in 150 children when Campbell studied 10,000 routine autopsies. In 34 per cent of this group of children ureteropelvic obstructions were found and in 62 per cent ureterovesical obstructions. In another series of cases studied by Campbell and Bottomly the same rela tive proportion of stricture location was found and too a similar distribution was found in adults. The significance of aberrant vessels in ureteropelvic obstruction is controversial but the association of these vessels is not disputed

The symptoms of ureteropelvic obstruction in children are pain in the back and flank, gastroin

testinal disturbances a d the associated vestical furbances in the presence of pouria including hematuria. The finding of a flank tum risalite panal in fluctive of a poor prognosal ristoration of the involved kid of The laboratory tests for recal function were not found to portray accurately the end results following surgery. The author found that retrograde pevelographs with delayed emptying more accurately demonstrated the fewon than the firm station obtaid of with nirs.

venous urograms.

Treatment was discussed under two headings () ureteral dilatations in early lesions and (z) surgery when dilatations fauled. The purpose of surgery is to relieve obstruction and the coexisting infection. Uretropelvic obstructions are considered to be either of intrinsic or extrinsic etiology, the latter most commonly due to an aberrant versul. The fundamentals of surgical intervention are listanciased and the use of ureteral split ing catheters in

emphasized
Mineten cases are reviewed 10 were in males and
o in females the ages of whom varied from 8 months
to 1 years. The left and right sides were equally
involved and in finitance billateral bistruction was
observed. Of these cases 6 were treated by dilata
tion 3 by the Tolev's operation which was followed
by improvement—case was treated by severance of
the aberrant versel and imphropexa with post.

perative dilatait in and good result was obtained by a bilateral nephrostom and the use f splinting catheters with severanc of a heasons poo results were btained both sides ephrectom wa done

5 cases the result re fail res heminephrec tomy relieved the obstruction in the lower duct in cases and left a important amount of functioning ti us to 2 cases and patient with bilat rail volvement refused treatment of any kind

Ros at Lacit Ja M.D.

#### BLADDER, URETHRA AND PENIS

Weyds, R. The Treatment f Tumors of the Urinary Bladder in add Stockh 945 26 589

Weyde report 35 cases of bladder turn is treated from 192 to 0.92 at the N region Rad in Hopital, Oal Norsa. The verage age of the male patients was 5 care and that of the omen 60.4 verage, but eight patient had lecromolitating bladder care norms to had malignant papilloma to repullonation care norms and 55 were in such poor condition that the pallbatton treatment was not given

If the first 5 ro care afte the opening of the hospital primary roenting, therapy was usually employed although I see at this time the pain in would have received combined surgical and radio-logical treatment. It high roe tigen doses It this time the auth radm it is protracted force to consultradiation if field two frontial and two

back. If possible a t t l dove of at least 3 500 r administ red t each ti ld approximat h 150 r being given daily. At tal tumor dose of approximately 5,000 or or more is given with 175 ky. App-50 cm. PS. Il tance and 1 mm. Cu filter. A pre-enthe author dose evitoscopic lectrocoagulation celtro very small papillomatica. I tumors with narrow noninfiltrated peticles and bases. Larger tumors are coagulated openly through a cystotomy.

In young people with one or several small panillomas, cystoscopic coagulation is done and followed ty careful postoperative barryation. On young na tlents with larger and more widespread papillomas cystot my congulation and implantation of ra d um needles are performed. In middle aged and older people bladder papillomas are always treated as a carcinoma and the author's present method consists of cystotomy electrocongulation of the tumor implantation of radium needles in the wound bed and postoperative roentgen therapy as soon as the incision is healed. The author uses 10 mgm. radium el ment needles in 1 mm, of platinum from cm apart and attached to metal wires so that they may be removed in 24 hours. After the radium mplantation a menteen dose of from 7,200 to 4,840 divided on four fields is given Widespread tumors which are not removable through a cystot hay are given primary mentgen therapy and at times the tumor is so reduced | size that subsequent radical electrocoagulation and rad um implantation can be performed. No cystectomies have been per formed in this series.

The autho believe that in both papillom, articiona and in infiltrating carcinoma, rottine carcinoma and in infiltrating carcinoma, rottine control of the carcinoma and in infiltration to indicated, under the carcinoma attempted the use of the McCarthy resectances or it transarrelinal implantation of radium pecellar. Of the 1st patients, 11 are dead of carcinoma. Of 7 patients, 11 (14.3%) are byong symptom free after 5 years and 20 (8%) are symptom free after three carcinoma and 20 (8%) are symptom free after three carcinoma and 20 (8%) are symptom free after three carcinoma and 20 (8%). The Reservation, 110 m. Reservation, 110 m.

Lezarus, J. A. Primary Malignant Tumors of the Retrovesical Region, with Special Reference of Malignant Tumors of the Saminal Vesicies Report fa Case of Retrovesical Sarcoms. J Unit Balt. p46 55 90.

A case of primary acroms of th semnal vesicle are ported, with a critical review of the Interature IDe a shor states that only 3 cases of primary acroms of the semnal vesicle (including his own) and so cases of primary cardinoms of the semilar vesicle have appeared in the Interature Since cardioms of the prostate abows a tendency to mystel the seminal vesicles has a timo believes that only 7 of the semilar vesicles are accountly be listed as at theotic. In the remaining 13 cases the prostate was involved in the realignant process and it is therefore not possible t state with certainty that the lesion originated within a semilar vesicle.

The disease is most prevalent among aged men and the left seminal vesicle is involved slightly more frequently than the right. Urnary 35 mptoms rang ing from increased frequency to acute urnary retention were present in approximately 50 per cent of the cases in which the symptomatology was noted in the protocols.

Metastases in the regional lymph nodes the liver and the lungs were reported in 12 of the 20 cases. The mortality in this group was approximately 85

per cent.

Because of the inability in most instances to differentiate clearly between intrinsic tumors of the seminal vesicles and the tumors designated by loung as tumors of the retrovesical space the author believes that it is more correct to designate this group of tumors involving the seminal vesicles aspmany tumors of the retrovesical space

FREDERICK R. LIEBERTHAL M D

Leadbetter W. F. Repair of Complete Tear of the Membranous Urethra. Case Report and Suggested Tachnique for Operation J. Urol. Balt 1644, 54, 549.

During wartune tears or ruptures of the deep worker may be caused by penetrating wounds or fracture of the pelvis with displacement or separation of the pubic ram! The latter is the usual mechanism producing this Injury in civilan life Because of the provinity to other structures such as penas bladder and rectum more than one organ is commonly injured. As a general rule pelvic frac tures are also associated with other injuries and the

mortality is high

The diagnosis of complete tear of the membranou. urethra is simple if the possibility of it is borne in mind. There is usually slight meatus bleeding void ing is impossible if the tear is complete rectal examination reveals absence of the prostate from it normal position behind the symphysis Because of bleeding or the accumulation of urine and blood in in the space behind the symphysis a soft mas i felt filling this region. A sound or catheter pa sed into the urethra will be palpated after its passage through the triangular ligament directly beneath the rectal wall. The passage of a catheter does not result in the withdrawal of urine, though occarion ally some blood may appear. Once the diagnosis is made operation as soon as possible is necessary for the bladder will empty into the perivesical tissue-

The operation of choice is one which approximates the prostate to the triangular ligament and repairs the treiting channel. The penneal operation of carried out as a primary procedure acc mplish; this, Generally because of associated injunes in a supraphic cyatostomy is possible at this time and regalir of the urethra is left for a later date.

The author presents a report of the findings and treatment in the case of a 23 year old solder with complete division of the membranous urethra causer by a tank accident There was a complete tear of the membranous urethra a sociated with the creatment of the pubsic as well a multiple skeletal injuries. A primary cystostom was lone

Later it was found that the prostate had retracted after the injury the apex having been pulled upward and nointed backward toward the rectum vesical neck was elevated and pushed forward cavity existed between the two ends of the cut urethra. Some urine was passed rectally. I erineal operation was subsequently performed. The urethra was threaded upon a catheter throughout its lumen and the prostate was pulled down to the triangular beament by two heavy silk traction sutures through the prostatic substance on each side of the midline which were passed through the triangular beament and the perineal ti wes out on to the skin of the permeum toward the scrotum. The proximal ure thra was similarly brought forward with silk sutures brought out to the skin

Drought out to the skin. The author proposes a new operation which would accomplish primary reposition of the prostate and satisfactory apposition of the torn ends of the ure thra by the uprapubic route possibly to be done primarily at the time of the first injury. After threading the entire urethra over a Foley catheter the prostate is brought to the triangular ligament by silk traction sutures which are payed behind the symphysis directly through the perineal tissues laterally and through the perineal skin at the base of the scrotum. No attempt is made to repair the urether proper. I guide of some kind should be kept in the urethra lump healing until it is certain that instruments can be passed from below. This operation is suggested instead of simple cylorotomy.

DAVID ROSENBLOOM M D

Schourup & Pinstic Induration of the Penis

1cl ad of Stockh 1945 26 313

The pathology of plastic induration of the peniis obscure It can ist of the formation of a thick placue of fibrou ti ue in the tunica albugines of the dorsum penis and is probably caused by vascular changes Cartilage or bone is deposited in the lesion in about 10 per cent of the cases. The incidence of this condition is low (26 cases among to ooo genitournary patients reported by Aislin and 12 cases observed among 22 000 patients at the Radium Center in Copenhagen) The only certain fact I the association of this disease in many cases with Dupuytren's contracture which i also rare I en erally to per cent of the cases have been reported a ha ing both affections Hamann f und thi a socia tion in 23 per cent of his cases and the author in 40 per cent of the cases a resented in the article

The liagnost i rarely bubtful Ocea ionally restigenogram will help to how calcarcous deposits in the wall of the penus. I r the differential fragnost gumma gonortheal cavernitis, leucenia or tuberculou infiltrates and malignant tumors must be considered. They usually can be recognized by their location and the presence of ulcera

The medical and surgical treatment of this lisease a well a method of irradiation is discussed. The treatment of a cases is reported. Twelve wer

irradiated with x rays with from 500 to 2,000 r in fractionated does moderate filtration long distance and ahort distance arrangements varying with the case, and the testicles shielded 3 cases underwent surgery and 2 were both irradiated and operated upon. The results were as follows

Group Results	No. of
F lly setisfactory	3
Nearly satisfactory	3 4
Unsaturfactory N t followed up	4
Groups and 3 Results	No of Coton
Satisfactory	3
Less satisfactory Unsatisfactory	t

The principal beneficial effect was the alleviation of pain during erection which interfered with cohabitation

The author concludes that radiation therapy abould be attempted first the method of application being of minor importance and only if it falls should surgery be recommended

GERHART S. SCHWARZ, M.D.

#### GENTTAL ORGANS

Borthwick, W. M.: Tuberculosis of the Male Genital Tract. Gargen H. J. 1945, 44, 75.

The author's discussion of tuberculosis of the male genital tract is centered mainly on epididymitis. The age incidence is essentially that of the period of greatest sexual activity. Of 4 2 males with tuber culous epididymitis 88 32 per cent had at least one extragenital tuberculous lesion. He does not find that antecedent trauma or nontuberculous infection plays any significant role in the etiology of the discase. Diagnostic signs listed in increasing order of pathognomonic value are induration, enlargement and nodularity of the epididymis thickening of the vas deferens, involvement of the prostate and seminal vesicles, chronicity and bilaterality of the findings and tuberculous baciliuria. In the differ ential diagnosis gonorrhea syphilis, neoplasm non specific infection, epididymai cysts, trauma and torsion of the testis, and venous thrombosis of the pampiniform plexus must be excluded

Tuberculous epididymits was found to be blateral in 36.4 per cent of the author's cases in volvement of the tests was found in 35 st per cent, secretal fistulas appeared in 47 ot per cent, and pelvuc coincidental lesions were present in 87 st per cent. Sirty per cent of the patients suffering from tuberculous publishmits were known to have renal tuberculouis. It is beheved that the prestate is the link in the chain of infection between the kidney and the epididymits with the organisms reach the epididymis via the lumen of the was deferent.

The treatment of choice is surgical removal of the epididymis. When epididymectomy is performed, contralateral vasectomy is advised to prevent spread of the disease to the healthy side. The local prognosis is good but the general prognosis is that of generalized tuberculosis and is dependent upon conservative therapeutic measures and rest.

CLARENCE V HODGES, M.D.

Odegaard, H.: On the Treatment of Malignant Tumors of the Testis. Acts redial Stockh., 1045 15 445

In the 10 year period from 1976 to 1935 maller mant tumors of the testes in Norway knounted to only 0.3 per cent of the total deaths from cancer is only 0.3 per cent of the total deaths from cancer is men. From a practical clinical standpoint try may be divided into two main groups (1) sembons on the control of the cont

The usual treatment today is orthidectory with portoperative irradiation. It seems to be dear however from the various follow-up examinations published that rocatigen treatment of teratomas does not prolong life. On the other hand it is beyond doubt that rocatigen treatment of seminomas prolongs life. Himman has advocated a radical operation, i.e. removal of the lumbar lymph nodes on certain indications. He is of the option that patients with teratomas without claically demonstrable metastases should be subjected to radical operation and maintains that this operation is neither difficult nor dancerous.

If at the time of the orchidectomy lymph node metastases are not demonstrable, it probably does not matter whether the patient receives receipt therapy or not. In case of inclipient spread to regional lymph nodes one may perhaps have hope of destroying these metastases. On the other hand, if the seminoms metastases have become clinically demonstrable one must count on only a temporary innoversement.

At the Norwegian Radium Hospital, from 1935 up to and Including 1917 37 cases of malignant testicular tumors have been treated. Of these 31 were seminoona and 10 were malignant embryonal mixed tumors (teratomas). The oldest patient was 17 years of age, the youngest (with a teratoma) 1/9 years. In 19 cases the right, and in 18 cases the fit testis was affected. The 4archieon 2006 kets was carried out in 14 patients with seminomas (all with negative results) and in 1 patients with teratomas, (with a positive result in 1). The reaction was of so

prognostic value
Thirty-four of the 37 patients had been operated
on before admission to the hospital in 3 the condition was inoperable.

Nineteen patients with seminomas and 13 with teratomas have received adequate postoperative irradistion. Of the patients with seminomas, 11 survived and were free from recurrence for 2 years or more and 8 survived for 3 years or more 2 havelved for more than 5 years. Of the patients with teratoms, 4 lived free from recurrence for 2 years or more and 3 lived for 3 years or more. Prior to irradiation one of the survivors for 3 years (with a teratoms) was subjected to a radical operation (Hinmans) at which time metastases of the lymph nodes were found.

Nine patients died from metastases within from 2 to 23 months after admission to the hospital and 1 to 28 months after the onset of the symptoms.

JOSEPH K. NARAT M D

#### MISCELLANEOUS

Lazarus, J. A.: The Prevention and Treatment of Delayed Wound Healing and Ulcerative Cystitia following Surgery for Tuberculosis of the Genitourinary Tract J. Urel., Balt. 1946 55

The incidence of genitourinary tuberculosis has greatly declined within the past two decades.

Fostoperative fistula formation and wound dis integration are frequent complications following aephrectomy for tuberculosis

The ureteral stump plays a negligible role in the production of fistular

Singles are more apt to occur in the more acute forms of tuberculosis than in the chronic. A combination of deep x rs, treatment with ultraviolet radiation immediately following nephrectoms has almost completely eliminated this disagreeable complexation and has been found to be an extremely effective method of managing sinuses which are all ready present.

Of the 63 cases forming the basis of this clinical study 50.8 per cent revealed casvernous lesions of the kidneys removed 318 per cent py one phronis 8 per cent multiple abscesses and in 9 per cent the kidneys disclosed the lesions only when sectioned Bladder ulcerations were present in 63.8 per cent of the cases with casvernous tuberculosis of the kidney in 45 per cent of the cases of pyone phrosis in 100 per cent of multiple abscesses and in 66 6 per cent of the cases in which the kidneys showed lesions only when sectloned

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JOHN A. LOEF M D

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The author concludes the method of application
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surgery be recommended

Borthwick, W. M. Tuberculods of the Male Gentlai Tract Gentre M. J. 945 144 175.

The author a discussion of tuberculesis of the male incauthor a discussion of tuberculous of the male scales tract is contered mainly on existly miles scales tract is contered mainly on existing and and are genial tract is centered mainly on epologymia.

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secretal familias appeared in 41.01 per cent, and

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on generalized therepeutic measures and rest.

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At the Norwegian Ranium Hoppital, from 1937 to and locinding 1941 37 Cases of malignal telebrate for mineral bound hours hours hours and the comments hours bound and the comments hours bounded to the comments of the commen to said including 1911 of cases of militaria few and a said including 1911 of cases of militaria few and a said user tumors nave been treated. Of these, if are seminomas and 16 were malignant embryones in treatment and the work of the company (horastomes). seminomas and 10 were malignant embryonal nivers (1 to were malignant embryonal nivers (1 to were malignant embryonal nivers (1 to were malignant embryonal nivers). The weeks patient was 11 to were the youngst (with a training left years to no comes the make and to a grammable of the second to the second the second years or age the youngest (with a fertional 1%)
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JOHN A. LOUR M D

## SURGERY OF THE BONES JOINTS MUSCLES, TENDONS

CONDITIONS OF THE BOXES, IGINTS. MUSCLES, TEXTOURS, RTC.

Summey T. J., and Pressly C. L.: Sercoma Complicating Paget a Disease f Bone Ann 7 c 046, 23 35

Sir lames Paget in 1842 saw the first nations with the disease which he later described a cateltia Ultogether he saw 23 cases and his classic description of this spongs hypertrophy of bone i still unsurpassed. It begins n m ddle ace or later is very slow in progress and may give no other troubles than those which are due to the change of shape size and direction of the diseased affects most frequently the long bones of the lower extremity and the skull and is usually symmetrical. The bones enlarge and soften those bearing weight yield and become unnaturall-curved and missbanen. The sp. c. may sink and but the imbs however seem t shorten mrshapen remai strong l bt to pport the

Aurehow suggested leontuses osses as a name for the cases in which the disease is limited to the shall and facial bones. Early in the disease wh n the connective tissue

has replaced much of the oriental bone, there is bow ing of the softened weight bearing bones. As cancel. lous bone is subsequently in didow in large amounts the cortices become thick and hard and the typical mosale pattern f lamella develops with fibrous tesue replacing the marro

The cause is till k n but the original acceptance of a chronic flammation tend to be replaced by the concentio of some endocrine cause the narathyroid seeming to be the most probable offender. Serum alkal ne phosphate is high but as vet no other blochemical findings contribute to a

solution. Since many cases I Paget disease are relatively a ymptomatic the ocidence rat is dependent upon the extent of the routine mentgenological studies. and may be as high in 600 patients Eight of Paget s 23 pat t died hil nde observation (t of mallgnant less n ) and this tendency has been emphasized by ma student Sarcomatous d reperation of bones P get I sease is fou d in from 5 t 4 pe ce t of the patients according to most authors. The few h question this high per centage still admit a great r incidence than in the general populat on

The predisposing fact remains a most question, but Jaffe a belief that the trem indous p oliferative capacity of the tusue involved in polyostotic Paget a disease may n stielf be th basic atimulus for tumor formation seems most reasonable. The multiple bone involvement when scera are spared lends further credence t this idea. The incidence of osteitis deformans is greatest patients in re than

40 years of age with males apparently predominating among both the cases of the basic disease and those with complication sarcoms.

To 73 cases of sarcoma complicating Paret a decase collected from the literature, the authors have added their own a cases. Localization of the sarrows favors the femur humerus skull and tible, in that order and the scapula vertebra, and flown next most frequently. The prospess is grave for there is no known cure Early amputation with or without previous roentgen therapy is the treatment of choice and roentgen therapy alone may be pulliative in the terminal stages.

The 3 new cases are presented with illustrative toent renorrams and photomicrographs, which established the diagnosis confirmed at autonsy \ complete bibliography is included

I' YOUR E. BRENYECKE M.D.

Diez. B. R.: Chronic Tuberculous Synositis of the Wrist (Sino itis cronicas tuberculosas de la mo-neca) Rev A med argent 1945, 59 1 7

cases reported were of the author's own personal experience and are presented became chronic tuberculous synovitis of the wrist does not seem to have been previously reported in the Argen timan medical literature also, several aspects of the author's experience seem worthy of special notice The first was that of a robust officer of the maritime service in whom the bursae of all the tendons on the dorsal and lateral aspects of the left wrut had become progressively involved in a painless swelling with il ctuation and rice grain semation following a blow over this point 5 years previously The second case was that of a woman of 22 years with a similar history except that there was no known traums and the process involved both wrists. In her case the duration of the condition was a years

The operation was essentially under Kulenkamps brachial plexus anesthesia in the first case and under erve trunk and peripheral infiltration with novocain ( o'c) in the second An incision was made down the middle of the back of the wrist and skin flaps were held back on each side the posterior an ular liga ment of the wrist (ligamentum carpi dorsale) was incised with apparently a separate incision made d rectly int each osteohbrous compartment. Each bursa was carefully desected free down t its attach-

ment to the tendon itself In loosening the burse from the bgament, that por

tion of the latter which seems badly diseased may be cut away with the bursa, to leave only sufficient teadon substance to assure continuity or if the ligament has lost its continuity it may be reunited by a suture r by tendon transplantation it will usually reconstruct itself. An attempt may be made to reconstruct the esteofibrous compartment, although this again seems to be optional as the posterior annular ligament also shows a tendency to reconstitute itself. The wound surfaces were powdered with lodoform and the skin was sutured to leave merely fillform dribage. The part was put up on a posterior plaster splint for from 8 days to 2 weeks when the stitches and drain were removed and the splint was reapplied with however daily sessions of mobilization of the fingers.

Rich and abundant food vitamins and calcium were provided and in the second case the condition of the other wrist improved so much following the operation that the projected operation for this wrist was not required

The author's experience gives one the impression that the lesion reported might be susceptible to tuberculin therapy John W. Brenn M. D.

Kjelland, P. M.: A Rare Anomaly in the Elbow. Acta radiol. Stockh. 1945, 26, 491

The author presents two cases of patella of the elbow joint.

The first case was that of a washer woman 51 years of age. She suffered two minor injuries to the left elbow one when a small child and the other at the age of an outliner of which was treated medically. She also had rheumatism for many years but with out particular localization to the left elbow. The recent study was brought about by a slight injury to

the left elbow 4 days prior to the examination Roentgenograms of the left elbow in various views and under different angles revealed what appeared to be a patella of the elbow joint. Under fluoroscopic control this accessory bone was found to move with the electanon from maximum flexion to the mid position then from the midposition to maximum The upper pole moved forward and finally came to rest with the axis of the patella per pendicular to the axis of the ulna (Fig. 1) Injection of the elbow joint with 20 per cent perabrodil revesled that the contrast medium entered between the electron and the anterior aspect of the patella. which seemingly was covered with cartilage. In addition there was evidence in this case of arthrosis deformans.

The second case that of a 73 year old man without a history of previous injury arrived for examination because of rheumatic pain in the left elbow over a period of several years. Roentgenograms revealed a clesion that shaped accessory bone with a slight con cave anterior surface just above the olecranon which way thought to represent a patella of the elbow.

In connection with these a cases the author revened the medical literature. He was able to collect 15 additional cases. In 11 the disgnost appeared certain in the remaining 1, doubtful in the misjority the extension of the elbow was impaired and during movement the bone turned into the fosas of the observation as if there was a joint between the posterior surface of the observation and the anterior surface of the patella. The posterior the incepts ligament. Several of the cases re-



the traces ligament is attached the smooth anterior surface which is probably covered with cartilage. Arthrosis de formans, 3 different phases of the joint inovenent.

viewed showed in addition, characteristic changes of arthrosis deformans. It must therefore be assumed that elbow joints with patellae are predisposed for this affection. Otherwise the symptoms are few and patients afflicted with it are able to work.

The etiology 1 not altogether clear. The author prefers to assume an embryonic origin for several reasons. It is known that the olecranon sometimes has two points of osubcation, one of these develops into the olectanon process of the ulna and the other into an accessory electanon. By the same mechan usin the second point of ossification may develop into a patella of the elbow joint. The origin from a pseudarthrotically healed olecranon fracture as advocated by others is contradicted by the fact that in only 2 of the reviewed cases was there evidence of definite trauma. Moreover in a cases the condition occurred bilaterally and in a instance it was found in father and son | finally there is ample proof that patella of the elbow joint is encountered in the animal kingdom a for example in frogs and lizards in birds bats insect caters rodents and one of the edentates T LEUCUTIA M D

Lapidus, P W Spastic Fintfoot J Bone Sug

Painful so-called pastic rigid or contracted flattoot is a clinical entity vaguely described in most textbook. Most investigators have believed that the cin litton is an advanced phase of flaceful flatfoot wherein faults mechanics set up a reflex apastm of the ji nat is because if irritation in the jubilar region.

A review of the literature presents no more apteoned in on than those voiced by Todd who offers a concise summary of the present state of our ign rance and agrices with the present author a belief that treatment. It he spasm also he is not rational, box m is not the disease but the rould of the disease and manupulation with immobilization in varus is not pitywoological, the valgus possibly being a post it no frest for the involved joint.

It is generally agreed that the condition is painful with spann limited to the promator group. Trauma or occupational strain is noted appreciably often. The onest frequently occurs during adolescence. The incidence is alight compared to the large number of facerd flattect seen. There are various interpretations of the facts that per planns is not always present and that a normal or even caves condition of the longitudinal arch may concur. Tenderness has been noted both on the lateral and medial aspects of the foot. The role of arthritis of the subtalar iont is variable.

The author presents the auatomy and mechanics of the subtain ploin graphically and gives a logical explanation for the pronator spasm. Any lesion of the interessours talocalcancel ligament, regardless of etiology may induce the syndrome appropriately called spastic substair lesion. The substair loint surfaces may or may not be involved and per planus in our necessarily a part of the syndrome.

The author classifies cases of the disorder according to the extent of the pathological changes, and outlines the treatment appropriate for each type. Drastic procedures aimed at the elimination of pronator spasm are unsound and often dangerous.

FRANCES E. BEFENEURE, M.D.

#### SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Higgs, S. L.: The Use f Cancellous Chips in Bone Grafting J Bone Surg 946 25 5.

Screnty-one consecutive cases of bone grating were reviewed by the author 60 of which were operations for nonunon of the long bones. Among recognitions for nonunon of the long bones. Among no recognition of the long bones and cortical grafts plus cancelloss chips were used in most cases. All of the operations resulted in an union, although in 4 patients reoperations was required.

The r other cases were esteoclastomas solitary cysts and outcitis fibrosa cystica, and arthrodeses, in all of which cancellous chips were used to fill the

bone defects.

For successful use of cancellous chips, rigid first too is necessary. The autho has used a screwed-on only graft for the humerus, an onley or inlay for the radius and ulna, a sliding inlay or onlay from the other ley for the tibla, and a screwed-on onlay graft for the femur.

Scienced bone must be removed as well as all scarred and fibrous tissue. Bare muscles should be brought in contact with the bone whenever possible Skin grafting may be necessary

Despite the fact that many of the cases had recently been septic, bone grafting was done. Peni cillin and sulfanilamkie powder were applied.

Bone chips hasten the time of union by approximately 5 per cent. The chips with cortical grafts add in filling gaps in the long bones and defects in cysts and in filling gaps and crevices in arthrodesin operations. Design M. LYDPIRGU, M.D. DARGE H. LYDPIRGU, M.D.

Ernst J: Canalization of the Femoral Epiphysis According to Duvernay (Le forage de l'epiphysis fémorale de Duvernay) Acta radiol. Stockh. 1943, 20, 76

Divernay popularized drilling of the femoral epiphysis as the method of treating arthrosis of the hip For this purpose he uses a drill 6 mm. in diam eter which makes a channel through the femoral

neck and head.

Contradictory opinions regarding the mode of action of the operation have been advanced by various authors. Some claim that the procedure is followed by a diministion of the hyperemia which is responsible for narefaction of the bone. This hypothesis is based on oscillometric measurements which show larger excursions before than after the opera

tion. Others maintain that the hyperemia following the operation produces granulations of the boay structures. This result is compared with the sequelaof drilling the bone in cases of pseudarthrosis. Results of the operation reported by vancus authors differ to a great extent. This may be due to

authors differ to a great extent. This may be due to variations in the length of observation or to differ ences in the pathological conditions. From the anatomopathological point of wive some written differentiate two types of arthrowin of the hips (t) the science-oatomytric type in which sciencide bose tissue and crysts are found (this type has a slow evolution and llimitation of motion is more pronunced than pain) (s) the type which is characterized by atrophic alterations and rarefaction. In the latter type osteophyric formations are oft, and the osseous rarefaction and formation of cysts are marked. The cysts contrary, to those in the first type are not surrounded by sciencid tissue they are soft and compressible. The lesions develop rapidly and cause much pain. This type of arthrows yields the best results after drillips.

The author performed canalization of the femonipiphris at times in 39 patients 1 of whom were treated on both sides. The drill used was 5 mm in diameter. In the majority of the caveral canals, up to 8, were drilled the average number beling 5 or 4. Of the 44 operations 19 were done in womes and 32 in mm. The Irsion was present on the right side in 35 instances and on the left side in id. The ages of 19 patients ranged from 5 to 60 years of 1, row of 61 to 19 years of 6 from 41 to 5 years of 1, row of 10 40 years and of 2 from 11 to 80 years. The dors tion of symptoms in 5 of the patient exceeded 5 years. In 35 cases the condition was primary fidepatific, and in 8 it was secondary following a competition of the light fracture of the femonia need, congenital

As to the complications, 2 patients developed a hematoms, 2 developed philebits, 1 poeumonis, and 1 paresis of the peroneus muscle. In 4 patients a tenotomy of the adductor muscle was performed immediately following the drilling or a few days

dislocation, o cora vara.

A follow p of 6 months after the operation showed the condition to be improved in 76.4 per cent and anchanged in 23 6 per cent the respective figures after two years were 70 1 and 29 0 per cent, and after six years 64 3 and 35 7 per cent, respectively. After six years 63 6 per cent of the patients had no plan at all, while in the remaining 9 7 per cent of improved cases the amelioration was partial as far as pain and limitation of motion were concerned.

In case favorably influenced by the operation the cyts and ossour surfaction subsided to a great extent, being replaced by a solid tissue while in case in which failure was recorded, sometimes an increase of the number of cysts and rarefaction of box were found. The operation apparently was not followed by a diminution of the estephylic forms ton or decrease of deformity of the femoral head in other groups.

#### PRACTURES AND DISLOCATIONS

De Luca, G., and Farina, M. G.: The Treatment of Compound Fracture and the Closed Plaster Method (La cura delle fratture esposte ed il metodo degli apparecchi genati chiusi). Polidin. (see prot.) 1945 52, 402.

The closed plaster method used by the authors in both civilian and military practice for compound fracture is essentially that developed by Orr and later by Trueta, the circular plaster cast being spiled directly to the skin according to the principles hid down by Boehler following the first World War.

In the authors own material consisting of 1,886 open fractures 151 cases occurred in civilian life and 1735 were due to war. The closed plaster method was used in 137 civilians (90 per cent) and in 1,320 soldiers (76 per cent) In civilian practice good results were obtained with this method in 78 per cent of cases mediocre results in 10 per cent, and poor results in 11 per cent in military practice good results were obtained in 73 per cent mediocre results in 12 per cent, and poor results in 15 per cent. How ever the alightly higher percentage of unsatisfactory results in military practice is not a fair comparison because of the higher percentage of serious fractures for instance there were four times as many leg frac tures as those of the femur in civilian patients while in the military material fractures of the femur predominated markedly Primary soft tissue suture could be done in 112 of the civilian patients, but was not attempted in the war material. In civilian prac tice there was not I instance of gas gangrene or of tetaqus while there was a single example of each in the war material

The case with tetanus an open fracture of the lower ibid of the right leg was of especial interest in that the patient was erroneously twice given tetanus autitorin on succeeding days immediately after the fluory on the tenth day there were clear indications of tetanus infection, which however disspected under the usual therapy.

The authors primary treatment of the wound which they call mechanical sterilization and which

they seem to dutinguals from excession of the wound, consists of freeing the wound from blood clots, all foreign material, and devitalized tissues especially muscle tissue and detached bone splinters. It is initiated—if the condition of the patient permits—under intravenous eunarcon anesthesia after 1 or 2 hours in order that the patient may reuperate from any initial shock an attempt is made to bring the blood pressure to about 170/65, and diagnostic or other manipulations of the uljured part are kept to the minimum. At this time an attempt should be made to appose the bone fragments before they are incased in the plaster and even in the cleanest wound pethaps with primary suture sulfa drugs should often be insufficied into the wound.

The surgeon must first be assured of the vitality of the limb with extension in a Thomas or Braun splint (perhaps for a few hours at first) and close watch must be maintained at all times during the succeeding days. In fact, it may at times prove hazardous to enclose the limb of a wounded man in plaster in wartime if he must be transported immediately and transferred to the care of other surgeons who may not be aware of the limportance of the lesion

JOHN W BRITHMAN M.D.

Kirby C. K. and Fitts, W. T., Jr: The Incidence of Complications in the Use of Transfizion Pins and Wires for Skeletal Traction Ass. Sur., 1946 183 27

At a General Hospital in India, 342 transfixation pins and wires (195 Kirschner wires 95 Stelmann pins and 52 Roger Anderson pins) were used in the treatment of 233 fractures of the long bones. Three hundred and five pins and wires were observed during the entire period of their use and were removed at the hospital.

Among the 30s transfixtions there were 12 complications as follows soft ussue infection without esteemychius or the formation of a chronic draining sinus at the site of a Steinmann pin loosening of 4. Kirschner wires loosening of 3. Roger Anderson pins 2 cases of transient peroneal nerve palsy breaking of 1. Kirschner wire and alipping of 1. Kirschner wire bow. It is believed that the last 11 complications were avoidable, and in no case did a complication have any significant effect upon the course of treatment or the final result. The final results of treatment are not described in the article.

After an observation period of from 5 to 6 weeks there were no complications in the 37 transfirtions in which the final result was unknown Prophylactic oral sulfonamides were administered to approximately 60 per cent of the patients either because the fracture was compound or because of associated injury or disease and no infection developed in this group. Since infection occurred in only 1 of the 40 per cent of patients who had not received sulform mides and it is not at all certain that a sulfonamide would have prevented this infection, there is no statistical evidence that prophylactic sulfonamides played a part in preventing infection at the pin site.

in this series. In no instance was a prophylactic sulfonamide used for the sole purpose of preventing infection at the pin site.

CRARLES A. WALTMAN M.D.

Robertson R. G., Cawley J J., Jr., and Faris, A.M : The Treatment of Fracture Dislocation of the Interphalangeal Joints of the Hand, J Bees Surg. 046 a8 68

Fracture dislocation of an interphalangeal joint of the hand is an uncommon lipity and in the absence of adequate treatment results in severe permanent disability. Reduction is difficult to maintain by conservative methods of splinting, because of pressure necrosis of the soft tissues and the authors recommend a method of multiple skeletal traction which they employed successfully in the treatment.

of 7 cases of this type.

The finger is prepared for surgery and is covered with a sterile dressing A plaster-of Paris cast is applied from the proximal palmar crease high onto the forcarm and a wire banjo splint is incorporated in the desired position Under general or local anesthesia a small kirschner wire is inserted transversely through the neck of the phalanz proximal to the dislocation and another wire is placed transversely through the base of the phalanx distal to the dislocation. A third wire is passed transversely through the neck of the middle phalanx if the infury involves the proximal interphalangeal joint. If the distal interphalangeal joint is involved the third were is passed transversely or vertically through the distal phalanz. A small temporary dressing is applied about each protruding wire. The wire is then cut and fashioned to form a traction bow. To each of the bows a rubber band is attached and fixed to the banko The involved joint is then flexed to from so to to degrees and the desired traction is applied to each band at such an angle as to secure reduction of the displacement.

In the 7 cases treated by the authors the shortest period of traction fixino was 2 days and the longest was 3 odays. There were no operative infections and excellent functional results were obtained All 7 cases reported were caused by the patients being struck on the end of the extended finger by a baceball or softball. Custants A Watarous, M.D.

Soto-Hall, R., and Horwitz, T: Compound Fractures of the Femur J Am M Arr 946, 3

The late results of treatment of femoral fractures are reviewed in an attempt to throw light on the elikelogy of such complicating factors as separa monumon deformity and knee stiffness. The series includes 1 y compound fractures of which y had been treated by early internal fixation. To obtain the proper standard for comparative study, 46 simple fractures are included of which 14 had been treated by early internal fixation.

A very high proportion (20%) of compound fractures without internal fixation healed without

sepsis. When this group is added to the 44 per crut classified as mild infections because they represented mainly soft tissue sepsis and healed within 2 to 3 months, the whole picture presents a brilliant achievement of war surgery

The infected fractures (17%) include many case of extensive loss of soft and bony times with vascular damage in which septis is almost unavoidable. In cases treated by early internal firstion through an open wound, the incidence of severe septis was about 50 per cent higher than in patients treated without metal firstion. In the cases of most of there men the plates or metal had to be removed. In some cases severe infection appeared to be under control for several weeks while chemotherapy was being administered later the infection became clinically evident.

The following procedure seemed to offer the least danger for the type of fracture in which internal

fixation appeared indicated

A thorough definitement was done early, and was followed by delayed closure of the wound from 7 to days later. After the ordinal wound had bealed in an average of 6 days the fragments were appointed to the control of the control of

Chemotherapy included the use of penkillin or a sulfonantife compound, or both The findings cofirm the fact that modern antibacterial agents may 
produce excellent results in the control of lafection 
and in the reduction of complications, but that they 
are impotent in the presence of tissue which has lost 
its blood supply and which does not allow the drug 
to come in counter with the infection

Cases in which union occurred within a period of from 5 to 7 months were classified as delayed union cases showing neither clinical nor radiological evi d nee of bone union beyond 7 months were classified as having reached the stage of nonunion. Conaldering the frequency of severe injury with com minution and absence of bone fragments, the proportion of bone union which occurred in cases treated by external splinting was extremely high 86 per cent and definitely higher than the finding in fractures treated by internal fixation. A comparison of the time required f r union in simple fractures treated by open and by closed methods demonstrates that in spite of the improved apposition of fragments in the open cases, there was little difference in the period eeded for bone healing. The state of delayed union and of nonunion appears directly related to the degree of bone loss or dam age distraction and the presence of infection. Distraction even of a very minimal amount, is particularly harmful.

A comparison of the results with respect to retoration of knee motion in men treated by internafixation and in men treated by traction showed no appreciable difference. The indungs were not en tirely conclusive because in a number of patients who had had sepsis or delayed union the splinting and man made sectors of decayed union the spinitums had been too recent. The average period from the date of injury to the last examination was only 91/2 months so that the statistics do not indicate the final result but do describe the slowness in restora and result but to describe the slowless in restorato be definitely helpful were the use of resistive exercises and the use of delayed closure Successful delayed closure resulted in much earlier healing and les scaring so that exercise and activity could be An important disability was a hmitation of extension of from 5 to 10 degrees in about one-third of the cases This disability could be overcome after several weeks of active exercise, but its occurrence argues in favor of treatment of fractures above the lower third with the knee in full extension

Other complications were refracture in 5 patients

The authors conclude that early and adequate de and renal lithiasis in 6 patients brodement is the most vital factor in the successful treatment of compound wounds and that conserva the treatment of traction in balanced suspension gives extremely gratifying results Joint L. Lindquist M D

King, T : Slowness and Failure of Bony Union after Fractures and Osteotomies of the Proximal or Trochanteric End of the Femur Assiral N Zeeland J Surg., 1945 15 33

Nonunion is very rare in extracapsular lateral or intertrochanteric fractures of the femoral neck and low union is the rule. In the past 10 years the athor has seen only 2 cases of nonunion of fractures if these types. Prolonged immobilization provokes complications and difficult nursing problems which may be obviated by internal fixation by the Blount and Moore blade apparatus the nail and plate method of Jewett or Hawley and other similar methods. In addition more rapid osseous union realls because of good reduction firm apposition of the fractured surfaces and absolute immobilization The Stader or any other form of splinting which requires that the bones be transfixed by 17 inch nais above and below the fracture site and attached to some form of external holding apparatus is considered ered too dangerous because of the infection along the pur that must inevitably occur in a certain propor

Fractures at the base of the neck and between the to of the greater trochanter and lesser trochanter tion of cases. can be treated with the Smith-Petersen nail and no supplementary plate is required. When the fracture is situated distal to the level of the lesser trochanter a plate is attached to the Smith Petersen nail. In the reduction of fractures of this type, coxe were should be overcome on the orthopedic table by traction and abduction but the external rotation that is present in most cases should not be corrected by internal rotation of the limb as is carried out in intracapsular fractures Accurate reduction is ob-

tained by allowing the limb distal to the fracture to remain externally rotated about 45 degrees from the vertical plane and thereafter correcting any dif ferences in the angles of rotation between the frac tured fragments by pulling forward the trochanteric fragment with a sharp hook. When the nall is introduced the angle of declination is forward from 25 to 15 degrees instead of backward At least 1 to 11/2 15 ucgreen material of backward art reast 1 to 175 inches of the head end of the nail should stand out before the plate is attached, as it will be impossible to attach the plate if the nail is driven all the way in A modified Hawley plate with a reamed ring is used and is attached to the tapered head of the nail. It provides a strong fitting especially when fixed down by the screw When the angle between the plate and reamed ring is to be altered so the plate is parallel with the femoral shaft another taper headed remains with the semona share amother taper nestern nail should be used for the adjustment while the plate is held in a sterile towel. Levers, pliers, or vises should not be used to alter this angle as they may convert the absolute circle of the reamed ring into a slight ellipse and thereafter it will not be possible to attach the ring to the tapered nail head

Seven cases of nonunion among 120 subtrochanteric estectomies are reported and summarized according to Table I Three cases were treated by bone graiting. The pelvis is raised 6 inches from the operating table with sand bags. At least half of the operating table with said ones. At least than or the illac crest and adjacent thum should be removed to obtain a sufficient amount of bone for packing the ununited bone area. The site of nonunion is approached by an incision that is somewhat more anterior than the usual lateral one After the bone is exposed by cutting through the tensor fascis m exposed by cutting through the tempor inserts femoris and vastus lateralls muscles, a curved lever is placed medial to the femoral shaft and just below the base of the calcar femorale in the region of the lesser trochanter Thereby the nonunion area is seen from the front. A 1/2 inch gouge is used to cut a gut ter in the bone proximal and distal to the ununited area and this gutter should be as large as possible The gouge is driven deeply into both fragments so that bleeding cancellous bone is exposed. The fresh bone obtained from the ilium is chopped into small pieces no larger than mause. The chopped up bone is hammered into the medullary cavities of both fragments of the nonunited bone with the blunt and round head of a chisel until it forms a paste. After that the bone is packed in front and to the lateral side Finally any respectable looking bone that had been cut out of the ununited area for providing the gutter is chopped up into chips about the sire of gutter is chopped up into chips about the sire of wheat grains and inserted. When the wound is wheat grains and inserted. closed a bulge should be evident on the surface, indicating that a large mass of bone gratung material lies underneath. Immobilization is done by means of plaster spica or with the sling and traction All 3 patients of erated upon obtained sound osseous

The method was also used successfully in the treat ment of a patt nt with nonunion following a fracture of the upper femoral shaft a trochanteric fracture

TABLE L-ANALYSIS OF SEVEN PATIENTS WITH NOVUNION OUT OF ONE HUNDRED AND
TWENTY SUBTROCHANTERIC OSTEOTOMIES

ו	Ranson for Outsetony	Aga	Туре	Post- epitative Spirating	Treatment of Nonemon by Bean Grafting	Spilinting offer Book Orestone	Reads of Read Grafting
	Ontnearthritis	6,1	Lorenz Mc Murray 3/10/40	Sing and traction	Kope	-	
_	Ortecurthettis	1	23/3/43	Large spica	)/ana		-
3	Ostsoarthritis	D	Schem ±3/71/41	Situs and traction	29/5/42	Large spica	Outcom min
4	Normalon of fractured suck forms	**	Lorens Mo- Murray 4/ /4	Mag and traction	New	-	
1	Normalize mailed fractured speck featur	n	Loren Mc- Marray 1/1/4)	Lerge spice.	Neer		
•	Ostocarthritis	3	Locus Me Murray 7/7/43	Large spice	39/7/44	Many said traction	0
7	Companital dislocation of hip	11	Schanz #5/8/43	Siling and traction	19/4/44	Lorgo spica	Omeron gales

( ) Wheety patients were immeditured by aline and traction, and so in large phaster spices ( ) There were y patients with necession, and a of the land been immediated by sing and tracted and 3 by plaster spices ( ) Three of the y patients with nominion were operated upon by been graften

In the presence of infection an advantage of this type of bone graft is claimed over the tibial twin aw har of bone because the entire graft in on prome to be lost. Case 6 had a sinus which could not be cleared up. If was excised at the operation and the spongoes graft was employed. Infection supervened, but osseous union resulted after 6 months. When spongoes graft for sommlone is combined with nailling and plating the nail and plate are attached into the first type that the functure site and not on the lateral sepect. A complete freeing of the two nonnunted ends is unnecessary it takes too long and a harmful because it results in a disturbance of the blood rapple.

Internal fixation of the osteotomized fragments after subtreelsnetter osterotomy by nafling and plating eliminates external politting and the patient may be ambiant or at least free to move around in bed. Before the operation, the exact site line, and angle of the osteotomy must be planned because of the bends and angles that must be made in the platent to conform to the osteotomy. These details are worked out with paper models made from tracing of the x-rays. The plate is bent by the surpocal

maker to the shape required because the steel mort be hesited for bendling. The plating of a Lorent McMurray outcomey is fairly easy if the plate is bent beforehand and the orteotomy is performed to plan but the Schams operation is more difficult unless the upper fragment can be hooked down into the adducted pointom. Hit cannot, then the growth fully abducted below the site of outcolorny which will make the application of the plate rather dif-

which the displacement of catestomy has been abstituted by some surgeons for nailing of late anymaic fractures of the femoral neck to eliminate according to resting the complications should be process. The author surgeous complications should they occur. The author surgeous complications should they occur be not been supported by the fracture is more than 3 weeks old, the bone is comminated, or the patient is a young manual laborer. No cases utilizing this form of treatment are reported.

This article is well illustrated with diagrams and x rays. A short bibliography is appended CRARIES A. WAIDERS, M.D.

### SURGERY OF THE BLOOD AND LYMPH SYSTEMS

#### BLOOD VESSELS

#### Ross, J. P.; The Surgery of Arterial Disease and Injury Brit M. J., 1046, 1, 1

Vascapastic phenomena are seen in a vanety of conditions but true Raymaud's disease is a clinical entity. It is characterized by color changes in the digits produced by cold and occurring in attacks which show a rapid onset and recovery the extrem lies are affected symetrically. The peripheral pulses are preserved, and if there is any loss of tissue it is never more than a shallow ulceration close to the facetups true gangrene is extremely rare. The condition is almost exclusively limited to females is, not commonly excited by emotion and is not usually succeed with excessive sweating. The author spress with Lewis that it is due to abnormal sensitivity to local cooling of the small arteres.

In an attack the lumen of the digital arteries as aboost completely obliterated. The value of sympathetic denervation is that the lumen of the vessels as the complete of a greatly does not arest the circu taken completely. Since sympathetic may should be complete for satisfactory results the author favors the posterior approach of Smithwick and White for the upper thoracic chain. With the anterior approach of Telford there is greater danger of sparing sationizally shonormal finaments. For the lower extremity removal of the second third and fourth lumbar symples as the sure those of the contractions.

lumbar ganglia is the usual procedure

While there are many different causes of obliter ative arteritis it is the level of the block in the ar tenal tree not the cause which determines the clin ical picture and the value of sympathectomy in its treatment. Three clinical groups may be recognized In one a main vessel, such as the femoral or popli test artery is thrombosed and the presenting symptom is intermittent claudication in the call muscles The nutrition of the skin of the foot remains good since an adequate collateral circulation keeps the distal vessels supplied. If the level of the block is low enough to involve the sural arteries which supply the gastrocnemii sympathectomy is of little value for claudication. However if the block is more proximal sympathectomy will provide a consider able increase in the blood flow to the calf For this reason it is important to palpate the femoral and popliteal pulses as well as those in the ankle

Some information about the probable effect of synchrotic denervation may be obtained by tem porary block of the sympathetic trunk. A good exposse is an argument in favor of operation. On he other hand a poor response is not sufficient to key the patient possible relief by sympathectomy ince the postoperative improvement is gradual

In the second clinical group the distal arteries are uncipally affected and the characteristic manifestations are rest pain and nutritional changes in the skin of the foot. The pulse in the main vessels may be present even at the ankle but there is an abrupt drop in the surface temperature at the level of the arterial obstruction. Sympathectomy in this group may often abolish the intense pain and permit successful local amputation of the toes if gangrene has already been established

In the third group there is widespread narrowing of the lumen throughout the arterial tree. Sympath ectomy is generally useless and amoutation above

the knee becomes necessary

Fresh lacerations of the arteries should be repaired when possible, but contusions should be treated by excusion of the contused segment and ligation of the companion vein. When an arteriovenous fistula follows vascular injury quadruple ligation and excusion is the usual operative procedure Twice in cases of popliteal aneurysmal varix the vein was ligated above and below the fixtula so that the latter could be isolated and heated like an arterial branch. The main artery was preserved. These patients suffered from symptoms of venous obstruction afterward. Consequently, in 2 other cases the artery was ligated above and below the fistula but the vein was left intact the results were most satisfactory in these a patients. Because of the abundant collateral circulation associated with arteriovenous fistulas it is advantageous to preserve the vein when it is feasible to do so

THEODORE B MASSELL, M.D.

#### BLOOD TRANSFILSION

#### Iokhveds, B. I. Intracardiac Blood Transfusion Am. Rev Seriet M. 1945 111 116

The author reports 2 cases in which a physiological solution of sodium chloride glucose, and blood were used for restarting the intracardiac blood flow

In the first case the transfusion of blood through a needle inserted into the right ventricle corrected the apparent or clinical death and restored consciousness. Severe myocardial damage was probably responsible for the irreversible death that occurred 31/4 hours later. It should be emphasized that in apite of the marked flabbiness of the myocardium the needle which was present in the heart for about 15 minutes while the heart was contracting had left only a minute puncture.

In the second case the cause of collapse and clinical death may be attributed to the profuse hemor hage and to the rapid blood loss. A reflex shock occurred the volume of the circulating blood decreasing even more and the flow of blood to the heart diminishing greatly. Application of massage to the heart externally and the intracardiac injection of epinephrine might be insufficient in such cases ance the cause of death is not failure of the myo-

cartium but Inadequacy of the blood supply to It. The heart even when revived, will continue to work in vacoum and after a few seconds or minutes will stop again. Therefore, the author leckled to adopt a more physiological approach by increasing the contents of the cavities. It is known that an in crease in the contents although not maximal is an adequate impulse to search contraction, as long as the large last and the contents although and maximal is an adequate impulse to extend the contents.

heart is capable of responding to stimulation. In the second case injection of blood and salt solution into the left ventracle rather than the right was indicated for a definite reason. Insufficient contracting force of the recently revived heart and the pressure behind the injected solution would have been insufficient to overcome the resistance provided by the capillary netw rk in the lungs and nly in annificant amounts would have reached the left side of the heart By miecting these solutions directly int the left ventricle even the first and compara tively weak contractions of the heart re-established the blood supply t the vitally important brain centers and thus provided an antishock effect. In addition the increased volume output of the left ventricle adependently improved the coronary blood flow

When blood and other liquids are to be transfused into the right chamber the needle should be in serted into the lower part of the flourth left untercostal space one finger's breadth from the left margin of the stemum. This site will prevent injury to the intercostal neutrowaceular bundle and the internal mammary artery. The left ventracle will be entered when the needle is inserted in the same later space and from 2 5 to 3 cm to the left of the left margin of the stemum. Journel Garrie Marzia M.D.

JOAPHE GARRIE M.D.

De Weerdt W: The Influence of Sex in Transfusion Reactions (Influence du sexe sur les reactions transfusionnelles) Rev beige sc settl 945 5 144

Attention a directed to the role of the age of the donor and of the recipient in the Incidence of transitusion reactions. De Montia and Delhays in 193 found transitusion reactions in 8 pp ere cent of female to female to tensitusions in 8 p age event of female to the female to make transitusions in 8 pp ere cent of male to female to make and in 19 pp er cent of male to make. Hustin and Reny in 194 studied 624 transitusions, and found transitusion reactions in 173 per cent of female to female transitusion in 194 per cent of male to female transitusion in 194 per cent of male to female in 63 per cent of female to make.

The author has compiled data on 666 transfusions given by the Belgian Red Cross in 1943 and has grouped them according to the sex of the donor and the recipient a follows

	Trans-	le- schete	Par- centage
Female to female	88	±8	5 3
Male to female Female t male	5 90	35	3
M le to male	37	47	9.8
Total	666	5	

When grouped as to transfusion indications (neoplasms, infections anemias) more reactions occurred in the patients who had primary blood discretists.

The author believes that more research is necessary to determine the significance of the sex of the donor and of the recipient in transfusion reactions. C. Province Kirrux, M.D.

## SURGICAL TECHNIQUE

#### OPERATIVE SURGERY AND TECHNIQUE POSTOPERATIVE TREATMENT

Crocs, E. J. Schullinger R. N. and Shearer T. P. The Operative Treatment of Decubitus Ulcer 4nn Sure., 1046 123 53

The authors present a method of primary closure of decubitus ulcers in young paraplegic casualties Given the same back care postoperatively as the par anienc without bed sores the results seem to be quite as satisfactory as in patients with unbroken normal skin. The method seems to be applicable to the largest steral ulcers. With rare exception, the results may be obtained by a single stage procedure. Careful preoperative preparation and evaluation are just as important as is the technique of the operation itself

The operation is performed without anesthesia Complete excision of the ulcer including the pen pheral scar tissue and the base is essential Curvi mear incisions are made on each side of the defect and flaps are raised sufficiently to close the excised area. This is done by rotating the flaps on each side toward each other. Fine nonabsorbable sutures are used. Postoperatively pressure dressings are applied. Penicillin and sulfadiazine are administered when indicated BEYLLING GOLDHAN M.D.

#### ANTISEPTIC SURGERY TREATMENT OF WOUNDS AND INFECTIONS

Damrosch, D S.: Chemoprophylaxis. J Am if 4ss 1046 130 121

In November and December of 1944 a controlled program of chemoprophylaxis against hemolytic streptococcus infections which were then of epi demic proportions was employed in three small naval training schools

In the month of November significantly fewer streptococcal infections occurred in the groups re cerving sulfadiazine prophylactic treatment (in duly doses of 1 gm) than in the control groups. During this period sulfadiazine resistant Group A beta hemolytic strentococci were absent in one school and present only in small numbers in the other two schools In December however with new trainers there was a progressive fallure to prevent streptococcal infections in the treated group. The failure was related to the increasing prevalence of strams of Group A hemolytic streptococci which

showed resustance to sulfadiazine in vitro WALTER H. VADLER M D

Adamsn, D and Smith F The Role of Chemotherapy in Wounds and Surgical Infections. 1 # S# # 1946 123 70

For the past 2 years the authors have been jointly resiged in a study of the effect of bacteriostatics in fresh trauma and pre-existing infections for the

National Research Council of Canada. The object of this investigation has been to determine as far as possible the practical value of bacteriostatics used topically or systemically and both prophylactically and therapeutically in fresh trauma and pre-existing infections. The work has been done in civilian hospitals and the laboratories of McGill University A uniform surgical technique was adapted to the individual case so that the chief variables were the type of bacteriostatic and method of application

The following points summarize the authors

The nature age and extent of any injury or in

fection profoundly modify the value of any antibiotic substance Adequate surgery is more essential in the treat

ment of trauma than are chemotherapeutic substances

The mere presence of bacteria in a wound is by no means synony mous with injection

Bacteria tend to persist in a healing wound up to the time of complete and final epithelization without clinical signs of infection

Progenic streptococci regularly disappear from wounds and pre-existing injections treated with sulfonamides or penicillin Most other wound pathogens notably the staphylococcus pyogenes, bacillus proteus vulgaris pseudomonas pyocyanea and clostridium welchi persist in the presence of chemotherapy without necessarily producing clinical infection

Bacteria in wounds were a far greater hazard in presulfonamide days than at present despite our inability to sterilise a wound completely

Topically applied penicillin has not proved as effective an agent as sulfathuazole probably because of its rapid disappearance which makes frequent exposure of the wound necessary. Its routine sys termic use in a large ward with normal personnel is much more burdensome than that of the more convenient sulfonsmides

It seems certain that bacteriostatics keep the contaminated wound from becoming an injected wound This they probably do by prolonging the important lag period restraining free bacterial multiplication during this time and allowing elaboration of the natural barrier to microbic in

All this is facilitated by immobilization and oc clusive compression dressings which are changed infrequently

Hypersensitivity reaction from topically applied sulfonamides is a highly controversial issue. The authors have seen such little evidence of it with in frequent dressings that they consider the risk en turely unimportant.

There is no convincing evidence that the bacteriostatics which have been used significantly influence

the pseudomonas pyocyanes or bacillus proteus 520 vulgaris in a wound. This remains one of the out standing unsolved problems. Both the unreserved condemnation of bacteriostatics and their endorsement as "miracle drugs are the results of completely uncritical judgment. The truth as usual, lies somewhere between these two extremes. As far as traums is concerned the most efficient of the bacteriostatics is, at best, only an adjuvant to adequate surgery

In chronic surgical infections surgery is para mount. In scute localized infections surgery and chemoth rapy are interdependent. In acute spread ing infections, chemotherapy is the immediate

Melensy F L., Johnson, B. A., Pulsaki, E. J., and Colonna, F. The Treatment of Mixed Infec necessity tions with Penicillin. J Am. If An 946 30

In the treatment of surgical infections with peni cillin t is of the utmost importance to have a complete picture of the bacterial flora of such infections and to know whether the organisms present are susceptible, indifferent, or antagonistic to penicillin Attempts should be made to eliminate acrobic gram negative, nonsporeforming bacteria, which have a destructive action, before association species have developed resistance to penicillin

P-chlorophenol is the most effective antibacterial agent against gram negative organisms, of the presagents against gram regarder organisms, or are presently available antiseptics so far tested. In a concentration consistent with safe clinical application, p-chlorophenol was bacteriostatic and bacteriocala for all the gram negative organisms tested whereas o-aminoactrinie hydrochloride and 5 nitro a furaldehyde semicarbasone were not effective against the

The individual strain susceptibility of the gram pseudomonas pyocyanes negative organisms isolated from any given infection should be tested for the nhibitory action of para chlorophenol, 9-aminoacridine 5 nitro a furaldehyde semicarbazone streptothricin and streptomycin, since the sensitivity of different strains within the same species as well as the sensitivity of different species varies greatly All of these agents are com patible with penicillin and may be combined for local application to nected wounds. They may be incor porated in a carbowax propylene glycol base for local application and prolonged action in wounds

## Leacock, A.: Penkelliin for Chronic Undermining Ulceration. Brit II

The case reported here is that of a 32 year old soldier who developed a large abscess in the left arm following an injection of T. A. B. vaccine. Despite free incision and drainage subsequent pockets occurred and had to be increed. Undermining of the edges took place with the typical sones about the edges described by Melency The edges were excised and the sinues opened t give a large flat would Plaster immobilization for one month resulted in a grad

ual extension of the ulcer so that the involved area use extension or the meet so that the lavoived area covered most of the posterior surface of the arm. Various bacteriostatics were unavailing. Zinc perox ide was not obtainable. An anaerotic hemolytic are was not consumance. An anaerouse accessive streptococcus staphylococcus aureus and pseudomonas pyocyanez were isolated from the wound on

Seven and one-half months after the initial injec tion the lesion was treated with local penicifin (100 units per cubic centimeter) enough to keep the dressings wet. After 48 hours the penicillin sensitive organisms had disappeared and in 5 days improvement was marked. The processors diminished under 1 per cent acetic acid dressings Epithelization overed more than half of the area and Thierich grafts were applied to the remainder

The literature is discussed and the lesion is dif ferentiated from postoperative cutaneous gangrene. The author believes that penicillin applied locally may be more effective than sine peruside and may replace t.

## Wie-Chang Chui Miscellaneous Pharmacologic Actions of Citrinin. J Leb Clis. M 946 3 17

Citrinia is the antibiotic substance produced by the molds, penicillium citrinum, aspergillus terrent, and aspergillus candidus. It is also found in a flowering plant, the crotalaria crispata. It is an organic acid but has not been synthesized. It is stable, and can be autoclaved at 15 pounds of pressure for so minutes without loss of antibiotic power It has a fairly high antiblotic action on most gram positive bacteria but, unfortunately it is rather toric for higher animals. It has been reported as useful as though weaker than penicillin in the local treatment of sore throat of the common cold, and of abscesses. Nothing however has hitherto been reported about its local effects, possible injuriousness to the mucous membranes and skin, and its systemic effects and absorption from various regions especially after local applications.

Proposed concentrations of citrinia sodium in sprays, lotions and cintments for local application to the nucous membranes and the skin were not found to be demonstrably irritating or injurious however the slight or moderate irritation which they produced was not objectionable as indicated by tests in animals and human beings. Concentra tions higher than those proposed caused definite protoplasmic irritation or injury but this was temporary and readily reversible.

Systemic absorption of citrain, in animals recelving high concentrations and doses by Instillation into the nose or mouth is practically negligible.

Blood concentrations of from 1,4000 to 31000 citrinin were demonstrable after the introduction of high dozes of climin into the ligated coopings and stomach and all portions of the intestine of rats and also after intramuscular injection.

Rapid intravenous injections of catrinin in doses of from 1 to 100 mgm. per kilogram caused in mediate, though temporary depressor effects, which increased with the dosage this was due presumably partly to direct cardiac depression, and partly to perpheral vascollatation. The highest doses used could produce dangerous sustained depression. Slow intravenous injections of citrinin however had no roth effect. A reversal of the depressor to pressor action occurred in atropinized animals

The average bacteriostatic concentrations of cumain in broth were: 16 000 for the staphylococcus arrent, and 1,0,000 for the streptococcus hemo-lyteus. The antibacterial action was unaffected by human serum, increased by fresh human urine, and decreased by heated urine. Experimental staphylococci infection in mice was not prevented with high doses (one-half the toric) given intraperitoneally SAUPUE KAIN M D

Otton, C. T: The Use of Tantalum Oxide, Type 400, in the Treatment of Wounds. Indust 11 1945 14 949.

This article is a preliminary report of the author a capetinese with the use of tantalum oxide type 400 Doning the war, tantalum for surgical purposes was in great demand in the form of sheet, foil and wire with probably its most successful surgical application in cranioplasty Of all the metallic implants it has the highest resistance to corrosion in vitro and in vivo Furthermore body reactions to it are strictly minimal.

Discussion with metallurgats revealed that the bealing properties of the tantalum metal must be due to the oxide coating of the tantalum which is stways present. Therefore tantalum oxide powder was prepared in such a way that it was free of all flooddes and alkaline substances. As a dusting powder it is extremely soothing to areas of the skin which have been chafed or irritated It is easily strillured by heating at a temperature of 310 degree F in a dry oven and repeated sterilizations do not affect it. It is a material which can be kept early at hand and used in a perforated top glass bottle a powder blower or sometimes by dumping it out of an open container and spreading with a sterile amilicator.

Indications for use of tantalum oxide include whited finger nails chemical burns diaper rashes weeping tesions it can also be used for surgeon a force, for intravaginal application and as a pack by for sockets of freshly extracted teeth.

The danger of secondary contamination due to retressing is practically eliminated by its use. Relief of pan is attributed to the tight sealing off which the tantalum oxide crust produces.

STEPHEN A ZIEWAN M D

Buckia, C. W Bronstein, B., Hirshfield J W and Pilling M A.: In Vitro Action of Streptomycin on Bacteria. J Am. M Ass. 1946, 30 64

Streptomycin has been shown to be effective against a variety of gram positive and gram negative bacteria both in vivo and in vitro Before it can be used rationally in treating disease an evaluation of

dose intervals and sizes and determination of the bacterial susceptibility must be carried out. There are definite in vitro differences in bacterial sensitivity to streptomycin and within a given species strains may vary from extreme susceptibility to high re sistance The blood concentration of streptomycin reaches a peak soon after parenteral injection and then falls gradually to zero. To use the drug ra tionally one must determine if a high enough con centration is being maintained with reference to the sensitivity of the particular strain of bacteria isolated Frequently a smaller dose or longer interval between doses may be sufficient to maintain a blood level more than ample to inhibit the in vitro growth of the invading organism On the other hand these studies may indicate the need for larger doses given at more frequent intervals

This study had a threefold purpose (1) to determine the sensitivities of several species of bacteria to streptomycin (3) to correlate these sensitivities with the serum concentration of streptomycin that may be maintained in patients and (3) to determine whether the bacteria investigated developed a resistance to streptomycin in vivo

Bacteria were isolated from 38 patients with various infections such as peritonitis, empyema septicemia, infected wounds and burns, urinary tract infections and pelvic abscesses. The urine or nus was cultured before and at intervals during treatment with streptomycin. Each organism present was isolated in pure culture but complete identification of all the bacteria was not made following organisms were identified escherichia coli, aerobacter aerogens, pseudomonas aeruginosa. alpha and beta hemolytic streptococci and the staphylococcus. After the organisms were obtained in pure culture they were screened for their sensi tivity to streptomycin following which their sensi tivity over a narrower range was determined. The action of streptomycin on anaerobic organisms was not determined

The authors describe their method of screening to determine the approximate sensitivity to streptomycin, and a method to determine sensitivity value within narrower ranges than those possible with the twofold sensi dilution method.

It has been found that the parenteral administration of 500 000 S units of streptomycin will maintain as serum concentration of from 10 to 15 units until the end of 4 hours. Theoretically, then all bacteria reported in this article with a sentitivity of 8 units or less would be inhibited over a period of at least 4 hours by a parenteral injection of 500,000 S units of streptomycin.

Two hundred and twelve strains of bacteria were tested for susceptibility to streptomycin. The majority of the strains of excherichia coll, proteus vulgaris aerobacter aerogenes staphylococcus, and streptococcus were susceptible in vitro to the blood concentration of streptomycan that can be main tained in the average patient over a 4 hour period when he has been given 500 000 S unit dosages of

from 5 to 8 S units per cubic centimeter of blood. The majority of strains of pseudomonas aeruginosa Investigated were found to be very resistant to streptomyche. Resistant strains of a given bacterium were isolated from patients subsequent to the isolation of sensitive strains. The assumption is that resistant strains developed from the sensitive strains. Diphtheroids were found to be either very sensitive or highly resistant to streptomycin.

ROBERT R. BIGGIOW M.D.

#### ANESTHERIA

Wilson, G. H: Military Aspects of Early Analgoria and Anosthosia Current Rev. Lineals, 946, 5

The instructional approach to the military aspects of early analgena and anesthesia at the Medical Field Service School had to be basic enough to in cloid all of the important phases of the subject, and at the same time show the well trained anesthet ist the problems he would encounter in forward anestherias. This article discusses the overall problems involving analgena and anestherias in the combat areas.

The basic factor which determined the analyzaic or anesthetic agents used was their availability. The drugs available to relieve pain were eugenol, acctyl salicylic acid codene sulfate morphne utilate and morphine tartrate. The two narcotics available were phenolarbilat and sodium amytal. The morphine syrette proved invaluable in the combat zone che-shall grain of morphine tartrate was desolved in 1½ c.c. of fluid placed in a tube with a rubber disphragm and needle and kept terile with a cultu lold shield. This simple morphine tube simplified infections in the combat area.

Morphine was contrainducated in head injuries lung irritation from war gases heat cramps conditions resulting in amora and respiration depression and conditions in which the symptoms had to be observed to determine the necessity of operative intervention. Stress was laid upon the use of

morphine to relieve pain.

The anesthena used forward of the evacuation hospitals had to be simple safe portable, and rapid in action control Proceine hydrochloride was the agent of choic f r nerve block. Inhalation agents were lim ted to ther and chloroform was used as a reserve agent. The instructions concerning the use of i travenous anesthesia had two purposes First to keep medical officers I formed and p-to-dat concerning the fficial opinion of the Army Medical Department o th use of pentothal sodium Sec ond to give basic facts about pentothal sodium to those physicians who had little if a y knowledge of the drug. Care must be taken not to niect pentothat int an artery The da gers of this drug were enumerated. It was considered hazardous in cases of morphine overdosage, shock, infection of the neck, cervical or sublingual infections, in operations with great blood loss t those involving the airways Th

methods of resuscitation were enumerated. The nee of analeptic drugs was discouraged.

Spinal anesthesis had little value in the advanced medical units during active campaigning but as used in the clearing stations. Whenever available inhalation anesthesis with positive pressure apparatus was preferred for serious cheet injuries. General inhalation anesthesis was slow to give adequate relazation for intra-abdominal surgery and pertotal sodium was used more frequently than any other anesthetic agent by both the British and Americans

in the many forward installations.

Many Kan M.D.

Beecher H. K. Pain in Men Wounded in Battle.

4xx 5xxg 946, 3 96.

Two bundred and twenty five freshly wounded men in the combat zone were studied for this report. Attempts were made to correlate the pain with the extensiveness of the wound and to question the routine employment of morphine in these wounder patients. Consecutive cases were observed with no eslection other than that they had one of five kinds of wounds chosen as representative extensive peripheral soft itsue injury compound fracture of a long bone a penetrated bedd a penetrated choice and a penetrated abdomen The patients chosen were clear mentally and were not in shock at the time of overstelonize.

The findings were as follows 32 1 per cent had so pain 25 6 per cent had slight pain, 18 6 per cent had moderate pain and 23 7 per cent had severe pain.

Patients with penetrated abdomens had by far the most pain, possibly because of the spilling of blood and intestinal contents into the peritonal cavity. Of all the patients considered, only onefourth, on direct questioning stated that their pain was severe enough to require pain relief therapy.

Data were enough to require pain reases using the solution of the administered by rote and not according to the patient's needs. When morphine was occasional to the intravenous method was considered optimal to avoid the possibility of long delayed acts during periods of peripheral circulation shock. Morphine should not be used in nervous or manifest or hysterical states to allay fear or to promote steep for these purposes small does of barkturates have been adequate. Morphine should not be given in shock, unless pain is present in hypothyroidism, in the presence of dystanction of the luver or when even a mino deeree of anous causts.

Delayed morphine poisoning has occurred in battle casualties when the peripheral circulation was sluggish or loactive as 1 might be in patients who

are chilled and have low blood pressure

The treatment of morphine poloning lockeds the placing of a tourning t, internatiently looseed proximal to the site of the injection the percentage of a tourning t, international order of a oris by oxygen administration and artificial respiration and the intravenous administration of atropace (gr. 1/160) or ephedrine (gr. 1/1) is central situation.

grea intravenously to aid diurests. Gastric lavage gree intervenously to aid divires Gastine layage may be accreas a Body best should be conserved. may be necessary. Body heat should be conserved known and proper splinting and salesying pain in the house of the hardward splinting and some splinting and splinting and splinting splinting splinting and splinting sp bandanng are of use in allaying pain. Bounded men need addatives of the barbiturale type as well as account at times and small doses of both types of making and account as a small as a barbitural type as a small as a barbitural type of account account as a small as a barbitural types of account account as a small as a barbitural types of account account as a small as a barbitural types of account account account as a small account account as a small account account account as a small account accou estrolics at times and small doses of both types of one of either

kane with tail to do
The man in shock complains far less frequently of to enan manora companies are mas nequently or the would pain than he does of the great dates. caused by thirst

Donatelli L. Mephedine as a Pharmacologic business for Description the Passage for Anas satelli L.t. Mephedine as a Pharmacologic for Preparing the Patient for Abes Product for Preparing the Patient for Abes the Account of Patient (La moletina come farmaco de proparazione production) threes (La mercuna come intrinsco de preparason Palidia (ter ch.) 1945 52 105 Mephediae a new synthetic alkaloud derived from Airpacune & new synthetic alkalous genves from proposition (ethyletter of the hydrochloride of ) ppendine (cinvicater of the nyurochiorue of appending acid 4 methy) 4-phenyl-pipendine) was subjected to a series of attudies by the author at the subjected to a series of attories of the author at the institute of pharms cology and Toxicology of the fractions of resume colors and toxicology of the flarency of Florence under the directorship of Convenience of the state of the Associated presentations as a so-called presentation occurring in quantifications as a so-caused presentance of preparation to reader the induction

Gism that is a preparation to render the induction of smeal speathesis easier and less harmful to the a general abordinesia caster and teas national to the patient. These studies might be divided into four Parent These tributes might be divided into four members on propositions. In the first the section of from or propositions in the first the action of metalgated in the second psychic sensitivity was because of any synchronization for the second any synchronization for the second any synchronization for the second sensitivity was sensitively sensi arrentisted in the second any 5) negative circus between mephedine and seneral and local anotheric circus across arre considered in the third attempts were made to also for any following of manhacture and the consideration of the constant Agains were considered in the third accompanies were made to Culint any innutence of inclinations of important and more common nervous refers many important and more common nervous icinal mone common nervous icinal mone common nervous icinal mone common mervous icinal money ic State and a surroung operative or ancasticut formation and annual to the more vital vegetative faction and finally to the more vital vegetative disperses and finally in the fourth attention was directed to any infumous secondary actions provoked by mephedine

Group 1 The technique for this study in deter Comp 1 the technique for this situar in outer of Hadron (Pro-k and Pro-k and adming depression of the somatic semilivity massions of the depression of the somatic semilivity massions of the depression of the depress States (CHECK FROM II 2CN 1929 P 731) using states and the degree of the drig effect was Sauce 1838 and the degree of the drug energy was stopping to the animals response to painful timal (maching of the car lobe) The subcutangous injections of 1 per cent mephe

dise (a dosage of 15 mgm per kilogram) were found to bare little affects on the pain reconnect whitesa and the total of the pain response whereast the analogue. w pare little effect on the pain response Price and Schmidtones of from 20 to 50 mgm the analysis. with the state of from 20 to 50 mgm the analysis of the first became procretively more intense with communications of the first control beit analysis at the highest dosage. The effect of the standard for Section and the highest design in curring from 60 to 10 minutes and lasted for curring from 60 to 10 minutes and lasted from 6 from 60 to 130 minutes of the minute month to 10 130 minutes Since Alancini nal actor the minuted lethal dote for sunce pigs to be month of actor. down the minimal lethal dose for guines pige to the great margin of safety of mephedine deserves notice

a suspective deserves notice

So measuring paychic depression (preoperative

Annual Control of the Annual Control of the Manual Cont And the state of this drug mice (mus musculus) are business than their ester used after being accustomed to finding their constructed laby are need after being accustomed to anoung incine.

After a pecually constructed laby the files several days of accustoming the animals the month is a several days of accustoming the animals and the several days are also accustoming the animals and the several days are also accustoming the accustoming the accustoming the accustoming the several days are also accustoming the a they would be given subcutaneous injections of

from 25 to 50 mgm per khogram of mephedine and from 35 to 50 mgm per knogram of mephedine and the subsequent time for traversing the labyrinth wax the surrections time for traversing the unsystem was observed. Scale it was found that 25 minutes after observed Skain it was found that 25 immunes after pronouncedly 25 mgm had oven injected and more pronounceding the animal had lost com R hen 50 mam were used the animal had lost completely his ability to traverse the labyrinth this some of the animal completely after 85 minutes. Some of the animals completely after 85 minutes are also animals appearably those given minutes

Some of the animals especially those given

became permanently lost in the laby mith Omem became permanently lost in the lauyrining for the study of the potentiating effects of mephedine a secretal anesthetic preparation was of inepoccine a general aneathetic preparation was selected and also a peripheral or local agent. The scienced and also a perspheral or local agent the southern salt of s (alpha

Reneral ancaincile was the southin sait of 5 (sipna ciclocthens)) 1 \ methyl beta ciclocthens) 1 \ methyl barbituric methyl-beta cicloethenyt) i methyl oarbitune acid (eupai) and the local area thetic trea acurocaine (proceine hydrochloric acid) (proceine hydrochloric acid) third (general) anisathetic prepared was other 80 parts in 20 parts of anomicus prepares was einer so parts in 20 parts of other oil for aubstracous injection. The circuit ouve on for succutaneous injection in experi-mental animal employed was the fal (mus ratius) third (general) mental animal employed was the rai (mus raitus)
This animal was considered completely narcotized This animal was considered completely narcotized in heal had fallen on its side its head had fallen n ben it had talten on its side its need had fallen loosely the body was immobile and there was no reaction to painful stimuli action to paintui stimuii In this experiment the animals were divided into

in this experiment the animals were divided into from 1 up to 10 cc of the other (in 1 cc increase) and the last among pressure to the other (in 1 cc increase). from 1 up to 10 cc of the effect in 1 cc increases)
in oil the lest group receiving 30 mgm per kilogram

kink his mark the state of the fill of the state of the in oil the test group receiving 30 mgm per silverian of mephedine, which by itself always left the animal or mopneouse a nich by their airrays teit the animation of perhaps (ven & tribe excited this was normal or perhaps even a time exerted—this was followed so minutes later by the amounts of ether in tollowed so minutes later by the amounts of etner in oil specified for the control group. It was found that ou specineu for the control group. It was found that the rais treated previously by mephedine fell under the rate treated previously by mephedine tell under markosis much somer than the corresponding con narcoss much sooner man me corresponding controls and alept much longer and more deeply For trot and nept much longer and more deeply for the ether in all the control steps for per kilogram of a minutes while the other in oil the control stept for 3 minutes while animal receiving the preliminary treatment with the enimal receiving the preuminary treatment with mephedine alopt deeply for 87 minutes. From 1 to 6 mephenne archi nechiy tor of minates from 1 to 0 c c of ether in oil were not sufficient to bring the

co of ether in oil were not sufficient to bone the cosm in pretreated subject. Produced definite nar among the amount of the potentiating effects and amount of the potentiating effects. coan in pretreaten suojects. The potentialing effect of mephedine on the aneathetizing power of cher in of megnetime on the substituting lower of ciner in an analysis of the one half of even to one third the amount of other necessary ne thru the amount of einer necessary in the corresponding studies on methodine and

in the corresponding attouch on mephecine and crupal the conditions were amerally the same ex cytists the committons were acriefably the same except that guines pigs (cavia consys) were the caperi mental animals used. Evital in \$1 per cont solution mental animals used evipas in a 1 per cent solution as anjected intrapersonally in every animal nas injected intrapertioneally in every animal methodine in a per cont solution was injected mephetune in a per cent solution was injected authorized from 35 to 50 mem being used per subcutaneously from 25 to 50 mgm being used per criteria of narcous remaining the stude pig and the triceis of narcovis communing on same a state of the rat in the previous study of the same Mith the larger of the 2 dosages of mephedine

that the larger of the 2 dotages of mephedine which sense the produced but never nations while with whose no provinces our never narcous wine with the effect of the effect of the provinces of the effect of the effe the smaller docage (35 mgm, per shortern) the effect of the animal. Likewise was father an excitation of the animal. Likewise with the evipal when a immistered alone 35 mpn with the evips; when a iministeren sione 23 mgm were required to induce a narcosis of 34 mnutes while 50 mgm lengthened the natcoile period to 70

minutes. With the mephedine preparation, however the narcosis appeared sooner lasted much longer and was much deeper with more complete muscular relaxation. In fact, if 30 mgm per kilogram of menhedine were administered to the subject previ ously, the as mem, of evenal, which produced nar cosis lasting for an average of 34 minutes resulted in narcosis lasting 74 minutes or more than twice as long and with the aid of mephedine 14 mam. of exical became sufficient to induce the parcotic state.

In the succeeding studies with evipal used intra venously on rabbits the same potentiation on the

part of mephedine was observable.

In order to test any potentiative effect of mephedine on the local anesthetic power of procaine hydrochloric acid the corneal reflex of the guines pig was used This was induced by touching the cornea at sec and intervals with the Frey brush, from a to 10 such stimuli usually being sufficient. Procaine solutions in dilutions of 0.5 to 10 per thousand were instilled into the confunctival sac and retained in contact for a or a minutes, the anesthetic action beginning at strengths of o.5 per thousand. Menhedine given subcutane ously in doses of from so to so mem per killocram and synchronously with the instillations of proceine induced corneal anesthesia, frequently interms, even with the smaller dose of membedine (so mgm per kilogram) which of itself does not induce any evidence of such loss of sensitivity and with the noneffective strength of procaine (o 7 per thousand solution) Similar effects were observed in subsequent experiments with rabbits as experimental animals, and there is httle doubt left as to the potentiating power of mephedine on proceine hydrochloric acid with regard to its local anesthetic properties.

Group 3 To investigate the danger of damage or even death to the patient from reflex effects on the heart, respiration, or vomiting reflex, the rabbit was chosen for the experimental animal. It was tracheot omized and chloroform vapor was insufflated back ward from the cephalad stump of the traches through the pharyngeal and nasal passages and the resulting responsive effects on the beart action and respiration were recorded by kymographic tracmes. The same technique and tracings were produced after the endovenous perfusion of 1 mgm. per kilogram of a solution of mephedine in such a manner that the animals received 33 mgm. per kilogram of this drug when the reflex characteristics of these tracines. before the injection of mephedme, had entirely disappeared. Therefore taking the reflex irritation of chloroform vapors on the nasopharyngeal area as typical of all induction irritation reflexes of the other anesthetics and such reflexes as typical of all the reflexes incident to general anesthesia which are dangerous to the life of the anesthetized it seems evident that mephedine administered in advance of the inhalation anesthesia, is capable of depressing or even annulling all of the dangers arising from irritation of the upper respiratory tract.

Mephedme likewise seems to obviate the danger our respiratory and cardiac reflexes due to rough handling or pulling on a nerve during the operation. For this study the exposed sciatic nerve of the rabbit was stimulated electrically it being found that all evidence of such reflexes began to decrease with the perfusion intravenously (within a space of 7 minutes) of 7 mgm. per kilogram of mephedine, and that all trace of such reflexes disappeared with higher doubles

Likewise in the case of the vagus reflexes, mephe dine showed itself capable of suppressing the arrest of respiration and of the sudden hypertension and cardiac disturbances incident to atimulation of the

central stump of the severed yagus nerve.

Identical results were induced in the nerve of Cyon of the rabbit, stimulation of which normally leads to such a sudden and severe bradycardia and fall of blood pressure the necessary dote of mephedine in this instance was 14 mam, per kilogram.

Although mephedine does not entirely abolish the carotid along reflex it does attenuate such refex and thus promises to obviate such incidents as arise dur ing operations on the neck and floor of the mouth. These incidents are not always suppressed either by such anesthetic agents as evinal or by deep general inhalation anesthesis.

The author also investigated the reflexes due to pulling of other mishandling of pedicles and other forms of attachments of the organs. As a typical reflex he chose for study that produced by traction on the mesogastrium and suspensory ligaments of the stomach. This was accomplished by laparotom ising the animal (rabbit) and attaching a forceps to the stomach then closing the abdomen, so that the atomach could be subjected to traction from the outside Again the tracings showed that the consequent respiratory and cardiovascular reflexes could be abolished by the perfusion of to mgm. per kilogram of mephedine into the marginal vein of the

rabbit within an bour's time.

Before concluding this section of his studies, the author reports some studies on mice. They had nothing to do with the suppression of reflex responses by mephedine but were practically related to them. They concerned the primary or induction excitation of the animal as produced by other types of anesthet ic agents, of which he chose evipal as being typical. Six mice were injected endoperitoneally with a per cent solution of evipel, up to dosages of so 40, 60, 80, 100 and 120 mgm per kilogram. Of these dosages, all except that of so mgm. produced violent excita tion in the injected animal there were also clouic convulsive attacks followed by depression and ataxis. Forty milligrams produced convulsions and ataxia, but not narcosis and the animals recovered after about 20 minutes 60 mgm, or more caused narcosis and death in from 45 to 100 minutes so mam had no effect whatever Six other mice, 30 minutes previously had received subcutaneous injections of 3 mgm. per kilogram (1 per cent solution) of mephedine, in these, so mam per kilogram of evipal induced narcosh without excitation within 10 minutes, which lasted several minutes 40 mgm. or more produced death in narcoals without excitation.

Group 4. Mephedine in therapeutic doses exerts scarcely any or no action on the respiratory and cardiovascular systems but in large amounts it con stantly brings about a lowering of the blood pressure and a reduction of the amplitude of cardiac contrac tions and of the respiratory frequency These effects are however found with endovenous administra non, but not with subcutaneous injection nor with very slow endovenous perfusion even in large doses. For instance with an endovenous perfusion of 60 mem. of mephedine per kilogram in a rabbit accom plished within a space of 60 minutes the accompany ing tracing did not show any substantial modification of the respiration however 10 minutes after perfu mon of a rabbit with 60 mgm of mephedine per kilogram and per hour the tracing (revealing also the cardiac function) showed a lowering of the arter al blood pressure of about 30 mm of Hg and a diminution of the amplitude and frequency of res piration without any evidence of disturbance of the heart action. This however, tended soon to return to normal, so that at the end of 60 minutes (during which period 60 mgm per kilogram has been admin istered) all of the functions appeared to be perfectly

In conclusion the author desires to call attention to the fact that mephedine exerts a spasmolytic action on all smooth muscle (vascular bronchial, and intestinal) which effect deserves the attention of the Surgeon.

Allen F M Crossman L. W, and Lyons, L. V t Intravenous Procaine Analgosia Current Res Anesth. 1946 25 1

The purpose of this work was to use intravenous procline in the widest possible variety of panful conditions, the fundamental basis being that the great majority of palms are associated with local mammation or edema. Thus, procaine diffusing through specially permeable capillaries may produce analgena of the nerves in these tissues without

important effects elsewhere in the body At first the original method as suggested by Lundy was adopted, with a o r per cent proceine solution in physiological saline solution. The results of Lundy Gordon, and McLachlin, and Bigelow and Harrison were confirmed Subjective disturbances of over doses were dizziness blurred speech, or mental con lurion. The literature suggested epinephrine as the antidote for respiratory symptoms of intoxication and intravenous barbiturate for intoxication m the form of convulsions but the authors saw few of these complications. In the group of obstetric cases in which procaine was infused intravenously, this method created an optimistic impression that it might prove to be the ideal obstetric anesthesia and the fulfillment of the quest for the prevention of pain during childbirth A barbiturate was siways administered as preliminary medication reports were given in detail illustrating the use of intravenous proceine in such conditions as nucleus pulposus gangrene bed sore, and angina.

The authors modified the Lundy technique by increasing the quantities of infused fluid and procaune by lengthening the period of infusion, by using glucose solution when saline solution might conduce to harmful edema, and by extending the range of application of the tests to all kinds of pain ful conditions. The method was found to have definite though limited value and when hypersensitiveness to procaline had been excluded by preliminary tests and when the administration was kept within the limits set by dizziness or other subjective symptoms there appeared to be no danger whatsoever.

The experience with obstetric operations was extended to ordinary surgical operations of which 2 case records were summarized as examples of the method In a hip pinning 275 c.c. of salt solution containing 2 75 gm of procume were used during the course of 1 1/2 hours and 4 15 gm. of processne were used for a cholecystectomy in the course of 134 hours The first patient remained practically unconscious throughout with wide open staring eyes and a wild expression, but later on questioning he claimed that he could remember what was said and done during the operation but that he had no pain at any time. The second patient had the appearance of normal sleep with a peaceful facial expression and im-perfect muscular relaxation. The method has the advantage of rapid and flexible control absence of accompanying injury or after effects and a high degree of safety as far as can be judged to date As soon as possible, collaborative studies will be published which will attempt to establish a more adequate basis for acceptance or rejection of the method

The infusion in higher dosage has produced a chinically new form of general anesthesia by action upon the central nervous system. It is hoped that this method will prove valuable for various purposes, but there has not yet been sufficient experience to define accurately the uses imitations or possible dangers.

MARY KARP M D

Lobachev S. V: Refrigeration Anesthesia in Surgery of the Extremities. Current Res Anesth 1946 25 22

Investigational work was done at the Skilfossoviki Institute of Moscow on the technique of refrageration amenthesia, the history and bacterial flora of cooled tissues, and the relation of the sansathesia to shock. The material consisted of roccases 87 of which were traumatic injuries 4 of genigane due to viscular diseases and 9 of septi central Refrigeration anesthesia was considered excellent in 75 per cent of the cases good (slight pain on handling the nerve trunks) in 22 per cent, and poor (addition of ether required) in 3 per cent Postoperative complications occurred in 12 cases 4 developed wound infections. The mortality rate was 3 per cent, 2 patients succumbing within 23 hours to a high stage traumatic amputation of both highs complicated by brain injury and a third pa

tient dying from milary tuberculosis of the lungs months after the operation.

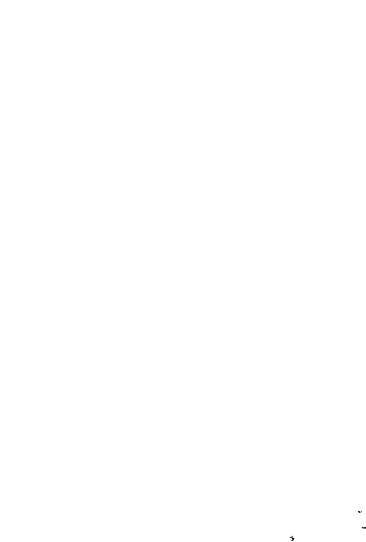
The tourniquet site selected was encased in ice for from 15 to 50 minutes, and then the tourniquet was applied Soft elastic rubber was used for this purpose the width of the rubber making no difference. The extremity was lifted prior to the application of the tourniquet in order to drain away the blood. The limb was then placed on a leather sheet filled with ice or snow and this was covered with another thick layer of ice or snow extending to from 5 to 10 cm. above the tourniquet. It was found that the temperature of the deep structures at the site of the incision was between plus 5 and plus 10 degrees C when the anesthesia was sufficient for surgical inter vention. More intensive cooling caused irreparable damage to the tissues, while higher temperature resulted in unsatisfactory anesthesia. Without a tourniquet the cooling was unequally distributed The cooling time needed was from 90 to 120 minutes fo the thigh, from 60 to 90 minutes for the leg and from 45 to 60 minutes for the arm and the forearm.

The temperature of the stump gradually returned to normal an hour after the tourniquet was re leased. After the stump was dressed it was covered with fee packs for 8 hours and the sutures were removed 12 or 13 days postoperatively as the healing was somewhat retarded because of the reduced metabolism of the cooled tissues.

It was found that pain sensibility of the limb was the first to disappear on cooling followed by loss of temperature semation, and finally by loss of tetrile senses. Histologically the tissues examined during refrigeration did not differ from those of normal controlled tissues

Primary suppuration was rarely found in solt of the injuries contracted in the street. The beteriological studies showed that the growth of indecorganisms was inhibited. The pulse was not altered even in serious cases but respirations were accelerated. The temperature remained mormal in that part of the body not refrigerated. There was no increase of palor sweat. Cynosis during the operation. The patient usually responded to stimell more actively as soon as refrigeration was effected. Apathy and somnolence gradually disappeared.

- The advantages were summarized as follows
  1. No anesthetic drugs are introduced into the
  system
- 2 There is a local reduction of temperature which counteracts the traumatic shock by numbing the tissues and especially the nerves
- 3 The application of the tourniquet and the cooling of the limb retards the formation and absorption of tourns.
  - 4. Toxemia is reduced and shock is controlled.
- 5 This method has special advantages in the aged and in patients who are seriously ill with septicemia. Mary Kary M D



which then appears to be embedded in a spongy mas. Myodika ostificans may add further layers of calcium around the joint. Numerous loose bodies are frequently present, often arranged in clusters to give the so-called bag of nuts" appearance. Although considerable swelling is usually present, fever and other signs of inflammation are absent. The lenon may therefore, progress unattended until multiple fractures in the adjacent bones and a dislocation cause complete mechanical disability.

A complicating pyrathrosis may make the differential diagnosis difficult. Ordinary degenerative arthritus may be distinguished from neurogenic Joint lesions by the absence of subchoodral cyst formation in the latter. The rapid progression the severity of the lesions and if present a perforating ulcer of the foot supplement the diagnosis of tabelic arthropathy

A spontaneous fracture or a fracture after slight trauma may be the first sign of tabes GREENET S SCHWARZ, M D

Bauer G: Observations on the Technique of Phisbography Act rad at Stockh., 945, 26 577

The author who has conducted too phiebographies since 1936 reports his findings in 180 leg phiebograms of patients suspected of developing thrombous of the leg vein. The purpose of these examinations was to make possible the early therapeutic administration of heparin or dictumantly, which indeed acceeded in preventing the spread of thrombo-



Fig. N visualization of the deep venous trunks in the middle third of the lower leg, due to thrombonis Within days phiegmania alba dolens occurred

phlebitis to the thigh in all treated cases. The findings were as follows

In y3 cases the failure of the deep veins to visualize was considered evidence of thrombosts. In 67 cases there was good or fair visualization of all the main venn. None of these patients developed signs or symptoms of thrombosis subsequently Eighteen cases deplayed sectional occlassion of a vein with dilatation of the preceding vessel segment. In 27 cases single or multiple filling defects were found in 12 of the 43 cases comprising the latter two groups, good circumstantial or indirect evidence of thrombosis could be established.

From his findings the author draws the following conclusions.

1 The most reliable x-ray sign of thrombous is non-visualization of the deep virus. An apparent constriction of a visualized win to a threadlike calber represents sedimentation of the contrast material and is not significant. It occurs only if the kg is placed in the hormontal position, a position which, nevertheless is to be preferred t the vertical for various other reasons.

2 Another valuable sign is filling defects caused by nonocclusive space occupying thrombi in the vrins. These might be confused with false filling defects which are located at ramification points of the vessels. They are caused by displacement of the contrast material by reflux of the fresh blood from a side vein into the visualized vessel and are smaller than the forms.

Various techniques are discussed. The author recommends pershordil or diodrast (ag 10 50%) for contrast maternal. An acceptabl substitute is a mixture of equal parts of intron and physiological saline solution. It necessitates, however the finish of the veins with from to to so c. of saline solution in patients who experience cramplike pains in the call silter the injection. Section of the latern malleolar vein 12 preferred to percutaneous verifications of the contrast of the section of the secti

GERRARY S. SCHWARL, M.D.

#### Lodge, T : The Anatomy of the Blood Vessels of the Human Lung as Applied to Chest Radiology Brit. J. Radiol. 946, 9

The literature on the gross automy of human pulmonary arteries veins and bonnell is summar used with special stress on the topographical relationing is these structures and the part played by radiological methods in establishing them. The author them recounts his own findings in polmonary bronchowascular relationships in the normal, which plans to tue later as a base for radiographic study of pulmonary vascular changes in response to disease or physiological stresses.

In this present study of the normal three methods were used the production of celloidin models by the modified corrosion technique (Fig. ) radiography of the lungs following injection of the vessels with

# PHYSICOCHEMICAL METHODS IN SURGERY



LEFT LONG

Fig. 1 Celloidin model of the bronchi and arteries of the two imps as seen from the posterior aspect. The trackes and brench are lighter colored and the arterial system is called the first property of the production of the first posterior as a process artery. For posterior is present as tracy. It is pulmonary artery. For existing posterior based artery. I, therefore a graph posterior based artery of the process. The process artery of the many streets are producted by the process of the process of

barum sulfate auspension and tomography in the living subject. The author then applied the khowl edge so gained in ascertaining which automical vessels and ordinarily be seen and with what fir specific automatic in the posteroanterior roent engages of 100 normal individuals.

He stresses the generally accepted facts that the facts shadows seen traversing the lung fields in filled the continuous seen traversing the lung fields in filled traversing the stress of the varieties and voins and not by broach, and that benedered that the first lung is essentially on the left substituting with considerable exactitude that the fight middle lobe artery with the exception that the former is derived from the left upper lobe artery and the latter from the right intermediate

In general, the author's findings in vessel bronchus thoughts in the human being were similar to fosc of Miller in the lungs of pigs and dogs and broochus, and vein are found in that order proceed

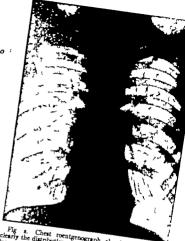


Fig. a. Chest trentgenograph aboving particularly clearly the distribution of the main arterial trunks in both impacts and the state of the main and eleventh the same and the left midsone the long tappen and the left midsone the long at the left bank parsing downward is the linguiar attempt at the left bank, where there is eliminated to the midsone of the physical state, where there is eliminated evidence of contact the left bank, where there is eliminated evidence of contact the midson of the midson

ing anticlockwise in the right lung and in the same order but clockwise in the left. The whole pulmonary arterial system was seen to follow the branching and distribution of the bronchial tree to its termination, whereas the venus tended to life distant from the arterial properties and to cross the bronchiat an angle.

Some veins may be seen to cross the arteries at an angle of almost 90 degrees an observation useful in differentiating veins from arteries in the roentgen ograph

On attempting to apply the knowledge gained by
On attempting to the survey of the mentgengraphs of
these studies to the survey of the mentgengraphs of
recognize and name the author found it possible to
recognize and name the appropriate of the first and
the fact that the shadows of the vens are in general
the fact that the shadows of the vens are in general
the corresponding arteries and to the observation
that vessel shadows are either a traight or gently
curved but never tortuous or is.

LILIAN DOVALDSON M D

#### Pinhler G E.: The Development of Rosnigen Therapy during 50 Years Redisler, 945, 45 503-

The author remarks on the almost immediate attempt on the part of physicians in all parts of the world to turn Reentgen a discovery of the x rays in December 80g to therapeutle uses. The interest in shoreacopic examinations with the new rays in the absence of any protection or any warning sensations early led to recognized damage of the skin of the hands and faces of the investigators while in some patients the prelonged exposure time necessary for making skull plates resulted in alopecia. The discovery of this epikting effect led Freund to treat a defiguring harry news in a young gut. He reported bis results in January, 1807 and widespread use of x rays in the therapy of skin discasses followed

At the time of the discovery of x-rays the essential equipment-Ruhmkorff or Tesla colls or a static machine and Crookes tubes-was already at hand in every well established laboratory of physics (Figs and a) and hence the necessary parts were quickly available to physicians but dosage for a given procedure was unknown and there were no instruments to record the physical factors used. The ntensity of the current and the penetrating quality of the rays were estimated by holding the hand in front of the fluoroscope dosage was estimated by biological effect-erythema or epilation. Ammeter milliampere meter and aninth rometer were how ever, developed relatively soon and the intensity of rraduation and dosage began to be estimated by photographic effect or the darkening I barrum platinocyanide duce. The small olume of cu rent produced in early apparatus necessitated tremen dous exposure times, so that the tubes quickly became overheated and the rays softer. The development of the int rrupterless coll by Snook in 100x leading t great increase in volume of the current produced the modifications of the Crookes (gas) tube togethe with accessory radiator and



Ing The first shadowgraph, made accidentally by Prof. A. W. Goodspeed of the University of Pennsylvanua while orking with the rays from Crookes tube in February. 800

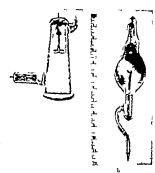


Fig. 2. a. Crookes tobe, reproduced by 31. C. Rentzeller Westinghouse Electric & Mandeschring Co Ima designs forsabled by M. techeller to represent the type of tobe used by Konetteen in his discovery of the says. Observe that the target was tho bettom of the pinn tobe. b. One of the tobe needs the belief Collinguistics May 20, the composition of the collinguistics of the collinguistics of the copy alaqued cathods and an inidio platform target. The size of these tubes is indicated by the tape measure (in laches). It will be observed that the bulb of the tube shown in B is not now than y inches in diameter.

water cooling devices, and finally the development of the hot cathode high reason stude by Coolings in 19.3 overcome many of these early difficulties. These advances made possible autificient constancy in volume and quality of the rays to enable radiotic the constance of elects produced by the x-rays first reported by. Reentgen in March 1866, led to the development of practical instruments for their measurement and the establishment of the unit of doors the reentgen in terms of that ionization (1928).

Early iberapeutic radiation was unaltered Per the depth dose measurements in too aboving that the intentity of the x rays diminisher rapidly from the surface to the depth of the body treated and that this decrease in intensity is much less if as absorbing layer such as 1 mm of alumnous is placed on the surface led to the use of filters in Europe. When higher voltage equipment became available with the production of a greater proportion of shorter rays filtration was locreazed both as to therebers and density of the metal theorem.

thickness and density of the metal chosen.

As t became possible to produce x-rays of varying qualities knowledge of the type of ray best suited to

the condition to be treated had to be sought, and the technique of application worked out. It became generally accepted for example, that in the treat ment of ringworm of the scalp the epilation dose should be given accurately at a single sitting even though a large area is covered but in most inflam mations and malignant neoplasms the full dose assould be divided that for acute inflaminations the dosage should be very small and given at short in one and for chronic inflammations larger doses and longer intervals are indicated Bergonie and Tribondeau had found in 1904 that immature cells and cells in an active stage of division were more sensitive than those which had already acquired the adult or resting stage and 10 years later Regard stressed the importance in the treatment of maing annes of fractional doses of comparatively low intensity extending over a long period since more peoplastic cells would thereby be exposed to irradia ton during phases of mitoris Coutard used these panciples when, about 1920 he modified the treat ment of malignant tumors especially of the oropharynx and larynx to obtain a high total dose with becreased destructive effect on the tumor cells but anti relatively less damage to the overlying normal issue than had been possible with some of the pre rous methods Recent development of supervoltage equipment has presented further problems in dosage

LILIAN DONALDSON M D' Foulsen, B R.: Investigation into the Time Factor in the Roentgen Irradiation of Cancer Cells.

A round cell sercome and a certain type of mouse carenoma were irradiated by x rays of varying in tensities over varied periods of time and the result

The tumor tusue was transplanted to a homog coors strain of nice before irradiation All of the mice then received irradiation of the whole body After a period of not more than 24 hours after com petion of the exposure (depending on the expension Bent group) the tumors were removed from the mke. The tumor tissues of all mice of the same experimental group were then mixed by mincing in order to minimize the individual variations. This these mixture was transplanted into a number of healthy mice and the effect of irradiation was then encescri

(1) By the take percentage centage of animals in which the tumor grew after

(B) By the mean latent period ie the number days after which 50 per cent of the takes became Pagent a palpable tumors (The normal values s nonirradiated tumor tissue are 5 days for

roma and 6 or 7 days for carcinoma Four intensities of radiation were used 58 r min

31/min 33r/min and 1r min The delivered e was the same in all of the cases it if it for to mice with sarcoms and 1,000 r to the mice with moma. A middle dose was delivered by a single

exposure of the mice to continuous radiation of con stant intensity which varied only with the experi 53r This necessitated exposure times ranging from 20 to 1 600 minutes The principal findings were as follows

Round cell sarcoma The take percentage dropped 25 per cent and the mean latent period rose from 15 to 18 days when the intensity was lowered from 58 r min to 1 r min. The main change was sobserved at the lowest intensity which is therefore considered a critical intensity. This tumor is thus more sensitive to low intensity radiation. The most effective intensity has not been reached in the ex perment but can be assumed to he below the critical intensity of 1 r min

2 Arebs \o 2 mouse carcinoma A drop of the intensity causes a proportionate rise of the per centage takes (up to 2000) and a reduction of the mean latent period from 17 to 13 days. This indi cates that protraction reduces the effectiveness of radiation on this type of tumor \o critical in tensity was observed with this tumor

I number of hi tological examinations of both tumors was performed aft r exposure to staggered doces of x rays (in t ps of 500 r) in order to study the relation of the cell life cycle to radio sensitivity. Within the studied range only the sar coma displayed a cyclic response to irradiation Mitosis of the sarcoma cells was increased after a certain low dose of x ravs was delivered to the

The author arrives at the following conclusions Within the studied range the carcinoma becomes more radioresistant with increasing protraction probably because the cumulative effect of radia tion is more than counteracted by the recovery which takes place during the low intensity irradia

on The sarcoma becomes more sensitive to radiation with increasing protraction because of the in erceased probability that the cells are affected during the sensitive phase of their cycle. This cycle may be intrinsic (the sensitive phase being the stage of be distinged the sense process of the stage of premitors) or induced by the physicochemical action GERHART S SCHWARZ, M D

## MISCELLANEOUS

Timmes, J J: Radiation Sickness in Negataki Preliminary Report (2 Ver 1/ Bull 1946

The author in this preliminary report presents his Ane author in the production of the radiation effects resulting from the explosion of the atomic effects resulting cross one capposition of the atomic bomb. The study was begun 33 days after the initial blast It was conducted at an improvised initiat biast it was conducted at an improvised hospital established at the Chinkozen I rimary nospital estate man difficulties school a fact which explains the many difficulties encountered

in the beginning an average of 20 new cases were in the organism and daily but within 2 week a institute to the cooperation of a new cases daily. The

investigation was abruptly terminated on September 25 1015 but some follow-up reports were secured later and they were sent to S. L. Warren and Shrids Warren in charge of the Army and Navy scientific atomic bomb commissions, respectively

The explosion of the atomic bomb is associated with a sudden excessive release of pressure heat, and radiation. The effects of the pressure and heat on human beings differ in no way from those of the ordinary bomb but the release of radiant energy is something new.

The first concern was the possible remaining radicativity on the ground and in the victims. The bomb was exploded at an estimated altitude of Roo feet with the ann to expend as much as possible of the radiant energy into the atmosphere. The author buried a raw films in the bombed are attached others to various objects about the so-called enter (a true enter does not exist). They all remained negative. Later investigators with the aid of the Geiger counter, likes fe cound the area safe as the extremely sensitive instrument registers only angighbe amounts of radiation. The effect on the victims was studied by attaching a ray films to their

limbs for it hour. These too remained negative hother pound of interest was the radiation sick ness. The Japanese claimed that most of the deaths occurring during the first werk after the blast were the result of this illness. However they did not differentiate between blast vectimes and standation vectims and attributed many of the thermal burns to radiation burns. It is the author's impression that a large percentage of the early victims indeed died of the radiation effect. This is explained by the fact that most of the civilians were not in air raid shelter when the bomb was dropped Concrete walls of 2 feet theknes probably would have af foorded adequate protection.

A study of the patients themselves reveale some interesting data. All victims observed had been within a kilometers of the center of explosion.

There were only a few x ray akin burns and they were mild in character. However many rases of alopecia were seen. In some the bare starred to fall out it to 5 days after the explosion, in others about the third week. At the end of a mouth a few of the patients had already begun to grow new bair of a downy nature. In none of the cases was the loss of bair commelter.

The most important effect of the reduction was on the bone marrow the majority of the case exhibiing an aplastic type of anemia. A white blood cell count under 1,000 indicated a poor pregnosis although 1 patient with a 400 count recovered. In some instances the blood cells completely disappeared before death. Petechiae gross betworthages, increased bleefing times (diren above as minuted) thromboertopeaks and unine revealing the presence of penhulus were noted frequently.

The average newly admitted patient complained of fever malaie loss of apostite bleefling pingires and hemorrhagic diarrises. Oral changes constituted common occurrences. The tongue was of a smooth glossy appearance and the mucosal membranes showed changes varying from a simple inflammatory lesion to deep necrosis. The teeth were generally loose and easily removed by hand. Two cases of necrosis of the mandfille and 1 of north were seen. Terminal inflection particularly bronchoppenmonia, was found to be the most frequent immediate cause of death.

The prognous was difficult to evaluate. Youth and a progressive rise in the white blood cell count represented good signs.

Therapeutic opportunities were limited.
T LECUTE. M.D.

# MISCELLANEOUS

## CLINICAL ENTITIES—GENERAL PHYSIO-LOGICAL CONDITIONS

Emerson, C. P., Jr and Ebert R. V: A Study of
Shock in Battle Casualties Ann Surg. 1945

One hundred and twelve battle casualties ad mitted to a field hospital with serious abdominal deci, or extremity wounds have been studied by the street shock. Detailed of these patients were shock. Detailed of these patients were made in all cases as well as the patients were of other the hemoglobin concentration or home of the the hemoglobin concentration or home and patients were provided by the patients when a protein concentration as well as hemoglobin contradings were completed in 57 cases in 33 and either in the course of transfusion therapy or of the patients.

The atterial blood pressure was found to provide most reliable clinical index of blood volume deficiency. All patients with initial systolic pressure below 8x mm of mercury excluding those with deficient blood 1x mercury were found to have mixed levels, the deficit averaging 4x per cent of the deficient pressure of hypotension had a diminution in blood to the contract of the source that exceeded 3x per cent.

Blood volume and plasma protein measurements indicated that some degree of spontaneous hemodi letton with low protein fluid often courted in patients with low protein fluid often courted in patients addening from oligenic shock the amount of this dilution, however was small rarely exceeding coc.C. It is concluded that a normal hematocrit patient of the demonstration of a mid anomal with every blood loss has not occurred. Severe anomal patients with the patients of the demonstration of plasma to receive the patients with marked oligenia.

The majority of patients presented no evidence of an accessive loss of plasma in proportion to the red with severe abdominal wounds there with resulted in a mild degree of extraored to have been as mild degree of extraored to have loss of exercised to have been most of severe shock before admission the hospital was 63 per cent. Hemorrhage appropriate the companion of severe shock before admission patient to the department of the severe in patients with lends with uncomplicated chest wounds.

Blood volume measurements were performed preparatively and postoperately in 10 cases in order to accrition the degree of blood loss occurring in the loss in 3 patients surjectly procedures. The average concerning the procedure of the average concerning the procedure of the procedure of the average concerning the procedure of Serial determinations of the blood volume and cated that hemorrhage occurred during the course of transition therapy in 11 of 23 patients studied. This patients was encountered most commonly in patients with severe wounds of the extremites, a averaged 40 per cent of the blood and plasma transitized.

Plasma protein measurements before and after the injection of blood diluted with equal volumes of latter in the blood stream is transient and not enough to produce significant hemodilution.

The mortality incidence of all patients admitted in severe shock was 33 per cent of those whose arternal pressure on admission exceeded 85 mm, of mercury cluded the first postoperative day. The majority of deaths were due to penetrating abdominal wounds.

Case are described in which the clinical signs of shock were unrelieved in which the clinical signs of plete restoration of the blood volume to normal life shock included severe infection femous volume the central nervous system, anosic anoxia combinations of anema oligenia and long persisting with terminal signs of myocardial insufficiency.

Therapeutic indications for the use of whole blood and plasma are cited, and criteria for evaluat ong the requisite amount of translution therapy are Joseph Gutta Millon.

Brun, C. Knudsen, E. O. E., and Rasachou F. Postsyncopal Oliguria, Kidney Function and Circulatory Collapse The Cause of Postsyn copal Oliguria. Acta med. Acea. 1045, 122, 351, 436.

In the passive errect posture with a ulting board unitentional circulator; collapse occurs frequently finds is immediately followed by reduced dureity which the authors call postsynoopal oliguria. This article deals with the investigation of renal function during postsynoopal oliguna and the cause of the latter.

Sixteen tilting experiments were done all of which were complicated by circulatory collapse. The oliginal lasted from 15 to about oo minutes after the syncope the duration apparently being proportional to the fall in blood pressure. The duration apparently being proportional to the fall in blood pressure. The duration apparently being proportional to the fall in blood pressure. The duration are rose to about and the specific gravity of the drine rose to about 10 or 10 or 15 for inthe concentration and the specific gravity of the drine rose to about 30 or 10 or 15 for inthe indicate of the finding clearance (glonormal filtration) are reduced slightly caressively in the latter instance when duration was resumed there values. The urea clearance was reduced in the period

immediately after ayocope and then followed by normal values. Fluctuations occurred as in the case of inalia and diodrast clearances but they were not nearly so pronounced presumably as a result of the increased return of urea in the tubuli during the olientia.

Since plasma is cleaned completely or usury so of diodrast by a single passage through the kildneys diodrast clearance wa taken as a measure of the quantity of the renal plasma flow. Diodrast is excreted mainly in the renal tubules and only to a smaller extent by filtration in the glomeruli.

Diodrast clearance often was reduced slightly just after syncope and then returned to the initial value and the syncope and then returned to the initial value and the syncope and then returned to the initial value marked temperary rise before the fail to anomal. The filtration fraction was without significant change during the period of oligaria. Hencoaccentration occurred during syncope but after the individual had been put back to the horizontal posture there was a gradual dubtion of the blood to a temporary lower than normal level toward the termination of the study. The blood 1 ressure and pulse rate remained unaffection.

In the discussion emphatis is placed on the chance for error (lavage phenomenon) in the clearance determinations which were then corrected and properly evaluated. Thus, the glowerular filtration and read rola ma flow are found to be normal during the

period of oliguria

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These findings, together with the high concentration lodge for inuite and the high specific gravity for uring point to a greatly increased realsorption of water in the renal tubules rather than to a decreased glomerular filtration as the mechanism which governs objustia

The authors then postulate that postayneopal oliguria is induced by a suddenly increased supply of antidioretic bormone from the posterior lobe of the pitultary gland, reflexly stimulated by either the cerebral anoxia or by the effect on the pressureceptor which is caused by the fall of the blood pressure

Having postulated previoush that an antidimetic hormone from the posterior lobe of the ptutary gland was responsible for the greatly increased re absorption of water in the renal tubuli which produced a portsyncopal oliguna the authors endeavored to demon trate the occurrence of this bormone

First they tred i show that the effect on the diarest is of a bum ral nature by transflusing blood from newly collapsed subject. Three of the recipil arts sustained at level fall comparable in severity and duration t the amount of blood transflused. In 4 and 16 years of severity and duration t the amount of blood transflused. The other receipts a perfect of durens fall which was thought t be du t refer action on the pitual tary gland from repeated painful ponctures during the remercians.

Since the posterior lobe bormone of the pituitary gland is proved to regulat the acretion of chloride in th. k iner. the chloride output in the urine was determined after collapse and after oligoria transmitted by transfasson. The findings were kirothel with those observed after the largerston of impedia, an antidiaretic extract of the posterior plushary lobe. The minute chloride output did not increase that the chloride concentration index fill below 1 while the plasma concentration decreased and the chloride in the surface marketly.

Finally, studies were made on a patients suffering from diabetes insipidus. These patients are assumed to have a reduced production of antidiurcus new patients of the portay proper oliginal was a mathel as in normal people but of much shorter duration. The urine choride concentration row to consider ably below the plasma chloride concentration. The same conditions prevailed after an insiphidin injection. The about period of oligoria would tend at point to an inability on the part of a patient with diabetes insipidus to produce antidioretic putular, hormone

These three series of studies taken together up get that prosymorous oliguna is conditioned by the pitulitary aland. The authors are goick to pout out that this type of oligunais probably meetry an acrom panying phresomenous to another pitulitary repulsive, first and foremost being a regulation of the tone of the capillaries. The oliguna often seen clinically is dreated to the control transficiency viz., in shock states from burns, anesthesia, and hemorrhage is designated as collapse oliqurais in contrast to portsyncopio oligunai, during which period the blood pressure is normal. Dwen H. Lyes, M.D. Dwen H. Lyes, M.D. Dwen H. Lyes, M.D.

Imperati L.; Malaria in the Fractice of Surgery The Inter Relationships between Malaria Infections and Surgical Diseases (La naistia in chirurgia. Rapporti ira inferiose maistica e ma lattic chirurgiche). Gise Mai del 1045, 1115-

The author was a captain in the medical branch of the Italian military forces in Sardinia stationed at first at the principal military bospital at Capilari and later transferred to Iglesias. During this time witnessed the disqueiting recrudencence of malaris in that country and gained the experience which details in part in a series of articles of which the fart in covered by this abstract. A accord artick will be concerned with the problem of surgery in the patient with malarist splecomogaly and a third will treat of surgery, in the malarial patient.

After a relatively brief discretion of his subject-including the pathogenicity of the plasmodum at information the pathogenicity of the plasmodum at information and in relation to the varying resistance of the pathent the effect of chronks malarita on the relationshothelial system and the melanocrusiation foocealistion of Henry-the authoritums to the details of his own personal views are desperiences. This discussion is again of rided into subsections the first concerning the malarial recurrences appearing as a result of surgical inputer and the second concerning the surgical syndromes occurring as manufactations of malarial infection.

In deciding on the complicity of the material plasmodium in the f brile condition of the patient

the author and his coworkers have depended as often on the leucopenia with the relative mononucleosus of malaria as on the actual finding of the parasite in the blood cells and malaria has been suspected even in continuous fevers since recurrent malaria is capable of producing a remittent continuous temperature.

The author remembers one instance of a thoracotomized pleural empyema in which after an initial favorable course a lever of a remittent continuous type auddenly developed intense and prolonged ope success developed intense and protonged treatment with quinine produced a fall in the tem perature, aithough no blood parasites were ever

The accoud part of this article discusses the cases in which the malaria itself produced surgical syn dromes resembling those of appendicitus cholecystitis or gastric or duodenal ulcer Certain elements of the true surgical picture (vomiting constipation, facies peritoneal and/or défense musculaire) were usually missing entirely and most of the other cases would not have deceived a physician experienced in the vaganes of malaria. However the author cites some dozen cases pronounced cholecyatitis (2 cases) or appendicitis by the medical department and referred to surgery in all of which but a the malarial nature of the dolor abdominalis was recognized sat infactorily and in time. Perhaps the case history disclosed malarial antecedence or perhaps the abdominal wall was not sufficiently spastic for a défense musculaire and out of proportion to the seeming amount of pain present in any event qui nine satisfactorily cured all but 2 of these cases only in a instances was laboratory help indupensable The first instance was that of an artillerist, who had been in Sardinia for 3 years. This patient had sud den violent attacks of abdominal pain, localizing to the right illac fossa, which were accompanied by fever (39 C. or theresbouts) with chills vomiting retention of feces and partially of gas, and some display of a neurotic disposition (weeping) Physical examination the following day disclosed aniosa, a temperature of 39 C rhythmic, thready pulse of 130 and a dry tongue the abdomen was uniformly spastic, retracted almost still (borboryg mi) and presented diffuse cutaneous hyperesthesia. However the abdominal spasm was not a true de fense musculaire as it was more or less equal in intensity on the two sides and could be largely in fluenced by distracting the patient s attention also the appearance of the fever had been too brusque. In addition, the patient did not look sick enough for the presence of a phlogistic process. Blood examina tion disclosed the plasmodium praccox in great quan tity Quinne did not control the fever until the accound day and even then the other symptoms per sired some abdominal pain remaining for many

The second patient was an aviator, first class who after a years in Sardinia suddenly developed intra costal pain, irradiating posteriorly and fever of 30 s.C. Quinine injections on this same day were unsuccessful and the patient was referred to surgery

under the diagnosis of acute cholecystitis. However the impression was rather that of an atopic, subhepatic appendicitis and the author was invited to examine the patient. The abdomen was found to be tensely spastic throughout and painful to palpation the temperature was 39 C with some morning remission the tongue was dry in the gall bladder region the pain was more intense and there was some muscular defense at this point neither the liver nor spleen was palpable. The topography and season suggested malaria, even though no parasites were determinable at blood examination however there were only 4 000 white cells with 10 per cent monocytes and a few hemohatioblastocytes therapy was again instituted and after 3 days the fever and pains had entirely disappeared. Here again the relatively good general condition of the patient throughout argued against a septic inflammatory

The author seems not to have encountered the phiogistic, even necrotic, processes at times, ascribed by other authors to malaria itself such as the strumitis suppurata of malarial origin of Ceballos and Gomez malarial peritonitis Demianow's appendicits of malaria, Caruso a appendicits of necrotic and gaugrenous type, or the perivasceritis perassi taria of Pepere and of Donati and he leaves open the question as to their authentically malarial character However he does cite an instance of hemoptysis in which operation did not reveal the origin of the bleeding and which he therefore ascribed etiologi cally to the malarial parasite He passed over such causes as turgor small vascular thrombosis, and the production of punctate hemorrhages capable of producing fatty degeneration to the theory of so-called neurotropism of the malarial virus wherein degen erative processes in the vegetative system give rise to vasomotor disturbances a true angioneurosa. This theory was strengthened by the author's observation of a malarial (plasmodium praccor) asphysia and paracathesia pallida bilateralis of the feet which cleared up on a regimen of quinine antispasmodics (atropin) and hot applications

Among the involvements of the nervous system have also been those resembling an ascending poly neuntis even involvements of the cord such as monoplegies with loss of reflexes and amyotrophies one of the author's patients, apparently as a sequela of malaria developed a rather pensistent neuritis of the radial nerve with medicolegal implications

The observation of the author which seems to be unique in the literature, is that of a tertian malarra with concomitant tumefaction of the testicle and epididymis without involvement of the endovaginal serosa or cord. The swelling and pain which was present disappeared gradually following cessation of the febrile attack, the detumescence being too rapid and complete for a pyogenic or other phlogistic proc ess, and seemed due solely to the malarial infestation.

In conclusion, however, the author warms against a too ready acceptance of what might be a surgical condition in a malarial patient as an exclusive mala

ral condition and he cites a instances one a reptured appendix and the other an intestinal perforation in a patient with typhoid fever in which operative therapy was deferred because of prejudice toward a malarial etchology of the abdominal pains. The patient with the ruptured appendix recovered later following operation while the patient with typhoid lever did not.

Wasier E.; A Chromaffin Tumor Simulating Graves Disease, 4ct med sc d 1045 25 1

Tumors arising from chromaffin tissue are very rare. About 100 cases have been described in the literature. Eighty of them had their source in the suprarenal glands, while the remainder arose from the paraganglia Eighteen cases of extrasuprarenal chromaffin tumors have been reported in the literature. In several cases the tumors have given rise to characteristic choical manifestations the patients being subject to attacks of headache a sense of pressure in the epigastrium palpitation of the heart excessive sweating coldness and pallor of the I mbs and a high blood pressure. In the intervals between attacks the blood pressure would be normal and the patient would feel well. Belt and Powell have given this group of symptoms the title of the suprarenal sympathetic syndrome nature of the duesee ha often been overlooked in these cases.

in account of a mininterpreted case with pice ochromocytoma originating in the right celusc ganglion is presented. A man age 49 had been well until 314 years ago when he developed a disease characterized by palpitation of the heart, excessive weating and nervousness which required hospital care in several occasions. During his first hospital tay the basal metabolism was 143 per cent the tube 8 and the blood pressure 176/113 there was enlargement of the heart, and albumin in the unne and the latter contained erythrocytes and hyaline and granular casts. During his stay in the bospital the blood pressure was 100/ 12 184/112 170/120 and 116/114 and the basal metabolism ranged from 146 to 120 per cent. A diagnosis of Graves' disease and nephritis was made and following preoperative therapy a thyroidectomy was done. The surgeon wa a doubt as to the diagnosis at the time of the operation and his histological examination of the excised gland showed no changes characteristic of Craves disease

The attacks of palp tation of the heart and excessive sweating returned. During the second stay in

the hospital the blood pressure varied between a 30/149 and 155/90 but no relationship between it and the pattent' symptoms was noted. The basel metabolism on four occasions was 140, 150, 116 and 105 per cent. The diagnosis was still considered thyrotosicosis with hypertonia.

Upon his the distry be became work and death occurred with signs of a substachoold hemoritage. Postmortem examination revealed the pheochromocytoma in the right celling ganglion, a farm hemoritage arterioselerous and arteriolar aclerois, and enlargement of the heart. Analysis showed that the tumor contained less adrenalin than the tumors in several other cases investicated by the much more several other cases investicated by the much more

exact biological examination.

It is of special interest in this case that it was interpreted as one of Graves disease. The diagnostic mistake is of interest for two reasons. In the first place Graves disease was suspected in some of the cases of chromaffin tumor published earlier. For thermore Belt and Powell drew attention in 1914 to the similarity of the syndrome of certain cases recently described as "nongolterous hyperthy roldism to the suprarenal sympathetic syndrome In the second place it is interesting that the basal metabolism was increased in this case not only because such an increase was misleading to the dug nosis, but also because it provided matt r for thought concerning the cause for such an increase. According to Cohen in 1917 adrenally increases the metabolism by stimulating the action of the sympathetic system. It has been found that pa tients with chromatin tumors are sympathicotonic, and it is natural to assume that in these cases an increase of the basal metabolism depends on an mereased production of adrenalin Hitherto the manifestations observed of chromaffin tumors have included a rise of the blood pressure, tachycardia, excessive sweating coldness of the limbs glycosuris, and hyperglycemia. To these manifestations one may add an increase of the basal metabolism which JOHN E. KARABIN M.D. will also be found

#### CORRECTION

Attention is called to the abstract on page 4. I the hard, 1946, issue of the International Abstract of Sourcer The heading of this abstract is incorrect and should read McCarthy 31 D. Lewis, J. R., and Conver, J. I. A. Standardined Back Burn Procedure for the conversion of the con

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